

Introduction of breast density notification within BreastScreen South Australia – Results of an online client survey

Liz Buckley,¹ Carolyn Nickson,^{2,3} Jennifer Stone,⁴ Ellen Kerrins,⁵ Shona Crabb,⁶ David Roder,⁷ Michelle Reintals^{8,*}

¹Flinders Health and Medical Research Institute, Flinders University, Adelaide, Australia

²The Daffodil Centre, The University of Sydney, a joint venture with Cancer Council NSW, Sydney, Australia

³Melbourne School of Population and Global Health, Melbourne, Australia

⁴School of Population and Global Health, University of Western Australia, Perth, Australia

⁵BreastScreen SA, Adelaide, South Australia, Australia

⁶University of Adelaide, Adelaide, South Australia, Australia

⁷Department of Cancer Epidemiology and Population Health, University of South Australia, Adelaide, South Australia, Australia

⁸BreastScreen SA, Central Adelaide Local Health Network, South Australian Department of Health & Wellbeing, Australia

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Abstract

Objective: Breast density is one of the strongest predictors of breast cancer risk and significantly reduces the sensitivity of mammography to detect breast cancer. Breast density notification is becoming increasingly common within screening programs in Australia. This opportunistic study evaluates client response to the introduction of breast density notification within BreastScreen South Australia, including their level of understanding, approval of notification and future screening behaviours.

Method: Clients attending three screening clinics (N=14,833) were notified by BreastScreen South Australia of their mammographic breast density, measured by the software program Volpara. Breast density was categorised as follows: A-almost entirely fatty tissue, B-scattered dense tissue, C-heterogeneously dense tissue or D-extremely dense tissue.

Results: Of the 5,137 survey respondents (34.6%), 90% supported continued reporting of breast density in the program. Around two-thirds of respondents (65%) felt informed to make decisions regarding their breast care and nearly all (98.5%) intended to continue breast screening. Anxiety in response to breast density notification was reported by 9% of all respondents (4.5% with breast density categories A/B vs 16.6% with categories C/D) and 14% reported confusion (10.7% with breast density categories A/B vs 19.9% with categories C/D). All notified women were and invited to participate in a follow-up survey to assess their response to breast density notification. Over 22% did not know breast density is associated with breast cancer risk and 55% were unsure.

Conclusion: Breast density notification was well received by most clients; however, knowledge about associated risk is considered low.

Implications for Public Health: Additional new strategies are required to better engage with general practitioners and clients, to improve breast density education and to develop a personalised screening program in the future.

Key words: breast density, mammography, women's health, population screening, psychosocial wellbeing

Introduction

BreastScreen Australia is a public health program available in all states and territories, which provides free biennial 2D screening mammography and targets 50-74 year old women by invitation and is also available to women from 40 years and over

75 years on request. It is a population-based breast screening, which is the best practice to reduce the burden of disease from breast cancer.¹⁻⁴

The BreastScreen Australia program screens up to 70% of the target population, and excludes symptomatic women, who require a diagnostic evaluation service.

*Correspondence to: Michelle Reintals, BreastScreen SA, Central Adelaide Local Health Network, South Australian Department of Health & Wellbeing, Level 1, 300 Wakefield St, Adelaide, South Australia, Australia;
e-mail: Michelle.Reintals@sa.gov.au.

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Mammographic breast density is an independent risk factor for breast cancer that confers approximately a two-fold increased risk of breast cancer in women with extremely dense breasts compared to women with average breast density in the general population.^{5–7} Although improvements to risk prediction models with the addition of breast density measures have been modest,^{8–10} the potential role of breast density in risk-based breast screening continues to be explored, as higher breast density is also known to reduce the accuracy of mammography.¹¹ Dense breast tissue can obscure and mask lesions in women, reducing the estimated test sensitivity of screening mammography by approximately 31%.^{12,13} It follows that the extent of dense breast tissue is significantly associated with increased risk of interval cancers (cancers not detected at screening and instead, diagnosed between routine screens).^{14–16}

As a result of the evidence based literature, the Royal Australian and New Zealand College of Radiologists (RANZCR)¹⁷ recently revised its breast density position statement in December 2023 reporting, “Whilst a future risk-based model for breast cancer screening is being developed, RANZCR recommends mandating the reporting of breast density in both screening and diagnostic settings in Australia and New Zealand”. This decision is largely supported by consumer advocates both in Australia and internationally.^{18,19}

Currently, clients are generally not notified of their breast density in population-based breast screening programs, but there are a few exceptions to this in Canada^{20,21} and Western Australia.²² A cross-sectional survey by Dench et al.²³ reported that two thirds (67%) of BreastScreen Western Australia clients felt informed after breast density notification, whilst 21% felt anxious and 23% felt confused. No studies have described the impact of breast density reporting within a population-based screening program where all clients are notified of their breast density category, not just those with dense breasts.

In 2022, BreastScreen South Australia (SA) implemented routine breast density assessment and reporting for all clients attending three screening clinic sites. The study was performed using “opt out” consent to allow clients not wishing to participate to be screened at another clinic site. To help evaluate this program-led implementation, clients were surveyed to assess the impact of breast density reporting on their knowledge and understanding of breast density, their associated anxiety, confusion and planned actions and their preferences and values related to breast density reporting.

Methods

Setting

BreastScreen SA is an accredited breast cancer screening service in the Australian state of South Australia. As per the national guidelines, it targets routine screening mammography to women aged 50–74 years and is also available to women from 40 years. A minimum of 95,000 mammograms are performed by BreastScreen SA each year, through eight fixed clinics and three mobile units screening across metropolitan, regional and rural South Australia.

Three South Australian breast screening clinics were selected for implementing breast density measurement and notification. The study clinics were selected to ensure a broad representation of the socioeconomic, cultural and linguistically diverse characteristics of women who screen in South Australia.

Recruitment and consent

All clients attending the participating clinics received the *Breast Density and Research Information Pack* with their screening invitation letter. Clients were informed of the research study, that their breast density would be measured from their mammograms, and that they would be notified of their breast density. Clients provided their informed consent for breast density measurement when completing and signing the routine screening consent form. If clients did not wish to have their breast density measured or notified, clients could opt out of the research study and attend at a non-participating screening clinic.

The *Breast Density and Research Information Pack* (see Supplementary Material) was developed following a review of the literature and other relevant breast screening websites, and in consultation with consumer focus groups and BreastScreen SA medical officers. The materials included a study information sheet, breast density information and a link to the public study website that contained further information, FAQs and videos. Translations of information packs were available for the five most commonly non-English languages spoken at home by screening clients in South Australia, as determined from the BreastScreen SA database (Tagalog, Vietnamese, Chinese, Greek and Italian; this information is routinely collected by BreastScreen SA at each screening round).

General practitioners (GPs), nominated by clients, were also sent the Information Pack and the information was available on the BreastScreen SA website.

Breast density assessment and notification

The client’s breast density measurements were obtained from raw mammographic images between 1 February 2022 and 31 August 2022 using Volpara Scorecard™. This software provides an objective assessment of breast density and avoids the potential for inter- and intra-reader variability.^{24,25} Breast density grade, using Breast-Imaging Reporting and Data System (BI-RADS) 5th edition breast composition classification, and volumetric percentage was recorded in the BreastScreen SA Client Information System.²⁶ Clients were notified of their breast density grade using the BI-RADS classification of A, B, C or D, indicating almost entirely fatty tissue (A), scattered dense tissue (B), heterogeneously dense tissue (C) or extremely dense tissue (D), respectively.

Invitation to survey

As per BreastScreen SA standards, all clients with a negative screening outcome received routine results letters approximately 2 weeks after screening. Clients were notified of their breast density BI-RADS classification within their results letter, with additional information about breast density as an attachment (See Supplementary material).

All clients who attended screening at one of the three participating clinics had their breast density measured and were invited to complete an online survey if they received a negative screening result. A survey invitation reminder was also sent via either SMS or email 10 days after the initial screening results letters were sent. The survey was open from 1 February 2022 to 12 September 2022.

BreastScreen SA staff (nurse counsellors, medical officers and call centre staff) were provided with training to respond to client questions regarding breast density and the research study.

Table 1: Characteristics of analysed cohort, n=4,065.

Characteristic	n (%) ^a
Age (years) (mean (SD))	62.17 (8.61)
Age group (years)	
40-44	84 (2.1)
45-49	205 (5.0)
50-54	563 (13.8)
55-59	643 (15.8)
60-64	834 (20.5)
65-69	835 (20.5)
70-74	651 (16.0)
75+	240 (5.9)
N/A	10 (0.2)
Ethnicity	
Aboriginal or torres strait islander	11 (0.3)
Asian	100 (2.5)
Caucasian/European	3028 (74.5)
Other	111 (2.7)
N/A	815 (20.0)
Self-reported BI-RADS	
Category A	949 (23.3)
Category B	1338 (32.9)
Category C	852 (21.0)
Category D	369 (9.1)
Not reported	557 (13.7)
N/A	949 (23.3)
Socioeconomic status	
Quintile 1-most disadvantage	828 (20.4)
Quintile 2	481 (11.8)
Quintile 3	588 (14.5)
Quintile 4	952 (23.4)
Quintile 5-least disadvantage	1211 (29.8)
N/A	5 (0.1)
Aria index	
Inner regional Australia	480 (11.8)
Major cities of Australia	3272 (80.5)
Outer regional Australia	55 (1.4)
Remote Australia	6 (0.1)
Very remote Australia	4 (0.1)
N/A	248 (6.1)

N/A = not available (no response/missing); BI-RADS = Breast-Imaging Reporting and Data System.

^a= unless otherwise indicated.

Survey questions

Survey questions were identified from the literature^{23,27} and shortlisted by two focus groups co-ordinated by a market research company, commissioned by BreastScreen SA. Participants in the focus groups were recruited from socially and culturally diverse backgrounds between the ages of 40–74 years. These focus groups explored participants' baseline understanding of breast density and the potential impacts of breast density notification. The final survey questions were tested by BreastScreen SA non-research staff and academic researchers to identify technical difficulties and questions that required greater clarity.

The survey consisted of 32 multiple-choice and open-ended questions (Supplemental material) that collected information on client's demographics, breast density knowledge, the impact of breast

density notification on factors such as anxiety and confusion and intended post-screening actions. All clients completing the survey received the same survey, but some of the questions depended on the individual client's self-reported breast density classification (breast density category A or B vs. C or D, and where no response indicated breast density category was not reported). The survey participants were asked to self-report their breast density as their responses were not linked to their medical records.

No question was mandatory, participants were able to stop the survey at any time and surveys could be completed anonymously. As a consequence, breast density as reported in the survey was not verifiable against BreastScreen SA records.

Data management and statistical analysis

Multiple records of participation in the survey were identified by duplicate IP addresses and/or responses (n=214); where survey records were found to be duplicated, the record with the greatest number of responses was retained. Personal identifiers (names, postal codes, dates of birth and contact details) were also used to identify duplicate participation, where these had been provided on an opt-in basis. If there were dissimilar responses from a matched IP address and no personal identifiers available, then it was assumed that different participants with a shared IP address completed the survey. The net effect of this process was to remove duplication and consolidate the record into one response per client.

The Index of Relative Socioeconomic Disadvantage (IRSD) and the Accessibility/Remoteness Index of Australia (ARIA) were used to infer area-level socioeconomic status and remoteness area from residential postcode.^{28,29}

Analyses were limited to respondents who completed at least 10% of questions, to exclude "false start" responses.

Descriptive statistics, counts and relative frequencies were assessed for all respondents and, for some outcomes, according to self-reported breast density. All analyses were undertaken using R statistical software (version 4.2.1).³⁰

Results

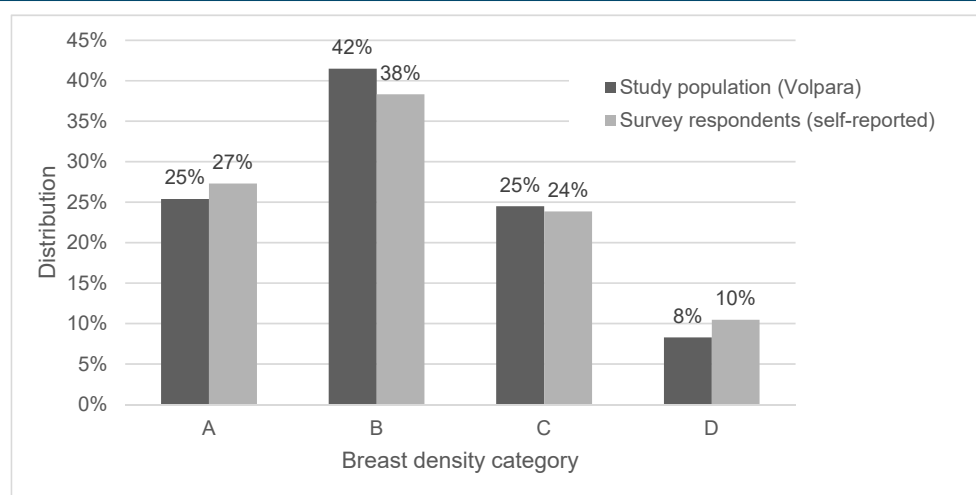
Study group

There were 5,137 (34.6%) clients who commenced the survey, of whom 3,606 (70.2%) responded to all questions. Responses to at least 10% of questions were provided by 4,065 (79.1%) of survey respondents and these were included for analysis.

The characteristics of clients who responded in the survey are shown in Table 1. Respondents were largely of European and/or Caucasian background (74%); more likely to reside in areas of higher socioeconomic status (SEIFA IRSD quintile 4 and 5, 52% as compared to Quintile 1 and 2 which is 32.2%) and reside in metropolitan/major centres in South Australia (80.5%).

A total of 14,833 clients had their breast density measured at the three study screening clinics during the study period. The mean age at screening was 62.2 ± 8.6 years. According to the Australian Bureau of Statistics (ABS) the approximate age distribution per category is approximately 15%. From Table 1, the proportion of participants from the younger age categories (40–54yrs) is underrepresented, while the 60–69-year age group is over-represented. Due to technical reasons,

Figure 1: Distribution of breast density measured by Volpara for all clients at participating clinics (n=14,833) versus breast density self-reported by survey respondents (n=4,065).



breast density could not be measured by the Volpara software for nine clients (0.06% of participants).

Breast density

Self-reported breast density category showed a similar distribution to that recorded for the whole study population (Figure 1) and this was comparable to distributions reported in another Australian setting³¹ and to US population data³² (Supplementary Table 1). All clients were notified of their breast density category in their screening results; however, nearly 14% of survey respondents indicated that their BI-RADS category was not reported.

Screening behaviours and breast density knowledge

Survey respondents indicated they underwent breast screening for a variety of reasons, including health and wellbeing (75%), peace of mind (48%), family history of breast cancer (25%), following GP recommendation (18%) and because it was free (18%) (Supplementary Table 2).

Asked about their perceived level of breast cancer risk compared to other women of the same age, 43% felt that their risk of developing breast cancer was similar to other women; 23% felt they had a lower risk and nearly 17% felt their risk was higher than others (Supplementary Table 2).

Prior awareness of breast density was reported by 57% of respondents; of these respondents, 23% had heard of the term at other radiology clinics, 14% through the BreastScreen SA program, 14% from the breast density study information pack and 15% of women couldn't recall the information source (Supplementary Table 3).

A proportion of respondents correctly understood that breast size and feel are not indicators of breast density (40.2% and 38.4%, respectively), and around half of the respondents were not sure (Table 2). Most respondents understood that dense breasts can make cancer detection more difficult on mammograms (73.7%), and around half understood that women with dense breasts have a greater risk of additional imaging and biopsy (49.3%). There was limited understanding that increased breast density also increases breast

cancer risk (22.8%) and that it is normal to have dense breast tissue (44.2%).

Planned actions

When asked what actions, if any, they would take following breast density notification, 22% of clients indicated they would perform (more) breast self-examination; 18% of clients would talk with their GP or a referring medical professional, while 17% would do nothing. A small proportion of respondents (4%) reported that they would consider more frequent screening and 10% would consider other risk or lifestyle factors that would affect their risk of breast cancer.

Plans for increased breast self-examination or screening increased with breast density (BI-RADS A < B < C < D) (Figure 2). Conversely, clients with less dense breasts were more likely to have no action planned.

Nearly all clients intended to continue breast screening (n=4,006 (98.5%)) and this was evenly distributed across breast density categories (data not shown). Most clients reported that they would prefer continued breast density notification (n=3,662, 90%), with minimal variation between categories of breast density (see Supplementary Fig. 1). A small proportion of clients (2.7%) did not support ongoing breast density notification.

Overall, 65.0% of respondents agreed or strongly agreed that they felt informed to make decisions about their breast care (Table 3), and this rating increased according to self-reported breast density category (65.8% for categories A or B vs. 71.6% for categories C or D). A small proportion of respondents (3.7%) disagreed or strongly disagreed with this statement, while the remainder were either neutral (22.1%) or unsure (8.8%).

Anxiety and confusion

Around 9% of respondents agreed or strongly agreed with the statement that knowing their breast density made them feel anxious, while 57% disagreed with this statement, and 33.2% were either neutral or unsure (Table 3). Of those who self-reported breast density category C or D, 16.6% agreed with feeling anxious compared to 4.5% of those who reported category A or B. Almost 15% (14.3%) of

Table 2: Survey statements to understand women's breast density knowledge, n (%).

Statement	Strongly disagree	Disagree	Unsure	Agree	Strongly agree	No response
Women with large breasts are more likely to have dense breasts.	298 (7.3)	1337 (32.9)	2202 (49.3)	395 (9.7)	29 (0.7)	4 (0.1)
Breast density can be determined by feel or touch.	296 (7.3)	1264 (31.1)	2084 (51.3)	396 (9.7)	17 (0.4)	8 (0.2)
Dense breast tissue makes it more difficult to see cancer on a screening mammogram.	19 (0.4)	90 (2.2)	957 (23.6)	2169 (53.4)	823 (20.3)	9 (0.2)
Women with dense breast tissue are more likely to require additional imaging and biopsies.	18 (0.4)	236 (5.8)	1793 (44.1)	1766 (43.4)	241 (5.9)	11 (0.3)
Having breasts that are mostly dense puts you at increased risk for breast cancer.	73 (1.8)	839 (20.6)	2222 (54.7)	809 (19.9)	117 (2.9)	5 (0.1)
It is common and normal to have dense breast tissue.	34 (0.8)	469 (11.5)	1750 (43.1)	1709 (42.0)	91 (2.2)	12 (0.3)

respondents agreed or strongly agreed that knowing about their breast density made them feel confused, while 52.4% disagreed with this statement, and 32.8% were either neutral or unsure (Table 3). Of those who self-reported breast density category C or D, 19.9% agreed with feeling confused compared to 10.7% of those who reported category A or B.

Responses stratified by quintiles of socioeconomic disadvantage showed no obvious linear trend and can be found in Supplementary Table 4. The proportion of respondents who reported feeling confused ranged from 12.3% to 15.6%. The range for those reported feeling anxious were 8.3% to 9.7%.

Discussion

This opportunistic study aimed to understand how breast screening clients respond to being notified about their breast density as part of real-world screening program participation, including clients notified

that they have lower breast density. The knowledge gained is expected to inform health service provision locally and more broadly in Australia.

Overall, most clients notified of their breast density did not report increased anxiety and confusion. Reports from focus groups and observational studies suggest that some women are likely to feel anxious when receiving a notification of dense breasts.^{23,33} In our analysis of observed (rather than hypothetical) responses to knowing breast density found that 9% of clients reported that they felt anxious, while the remainder reported that they did not feel anxious or that they were neutral or unsure about their anxiety. Just over 14% of participants indicated they felt confused about knowing their breast density. We found higher proportions of anxiety and confusion self-reported in clients with dense breasts compared to clients with less breast density. However, these estimates are lower than those reported in the BreastScreen Western Australia (WA) program, where

Figure 2: Intended actions after breast density notification according to self-reported breast density category (column percentages).

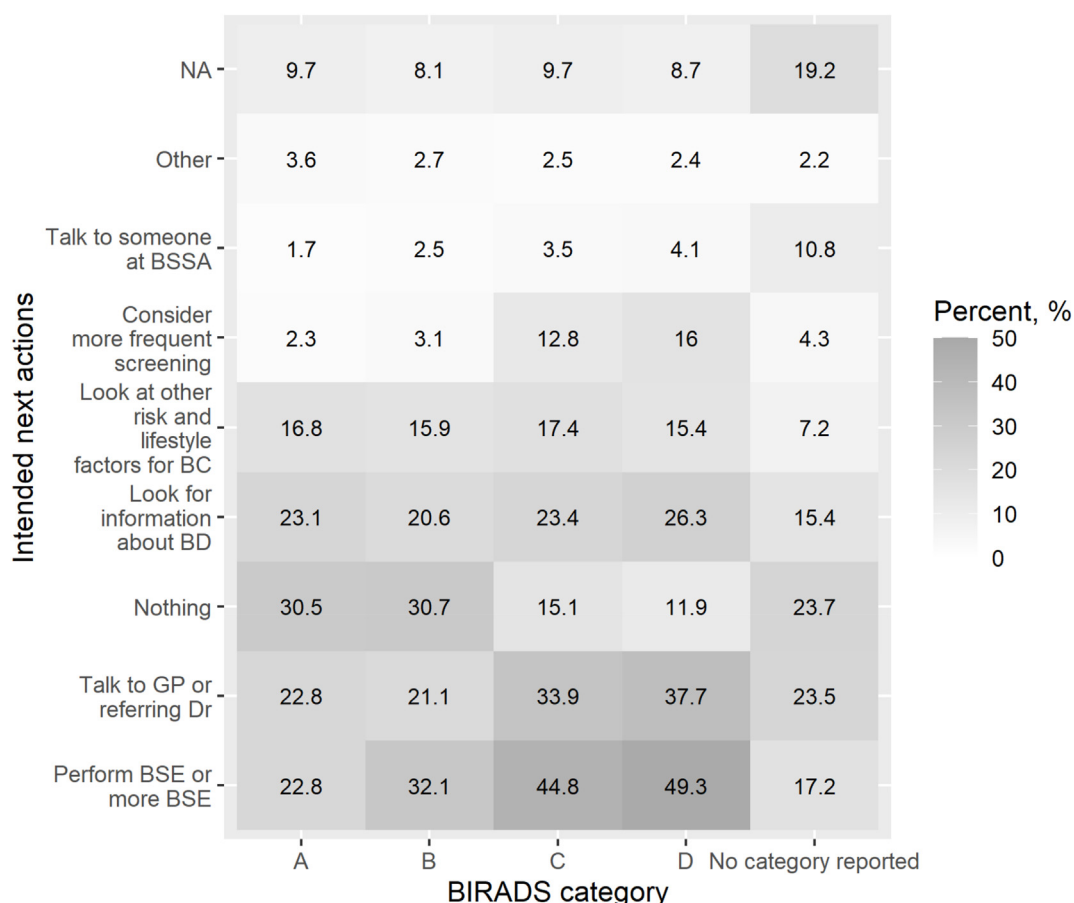


Table 3: Questions on responses to breast density notification by self-reported breast density category, n=4065.

Knowing my breast density	Strongly disagree/disagree	Neither	Strongly agree/agree	Unsure	No response
Makes me feel informed	152 (3.7%)	900 (22.1%)	2641 (65.0%)	356 (8.8%)	16 (0.4%)
BI-RADS A/B	83 (3.6%)	533 (23.3%)	1505 (65.8 %)	157 (6.8%)	9 (0.4%)
BI-RADS C/D	55 (4.5%)	219 (17.9%)	874 (71.6%)	70 (5.7%)	3 (0.2%)
No category reported	14 (2.5%)	148 (26.6%)	262 (47.0%)	129 (23.2%)	4 (0.7%)
Makes me feel anxious	2329 (57.3%)	1089 (26.8%)	365 (9.0%)	259 (6.4%)	23 (0.6%)
BI-RADS A/B	1544 (67.5%)	513 (22.4%)	104 (4.5%)	111 (4.9%)	15 (0.7%)
BI-RADS C/D	578 (47.3%)	376 (30.8%)	203 (16.6%)	59 (4.8%)	5 (0.4%)
No category reported	207 (37.2%)	200 (35.9%)	58 (10.4%)	89 (16.0%)	3 (0.5%)
Makes me feel confused	2130 (52.4%)	1025 (25.2%)	580 (14.3%)	308 (7.6%)	22 (5.6%)
BI-RADS A/B	1347 (58.9%)	550 (24.0%)	245 (10.7%)	132 (5.8%)	13 (0.6%)
BI-RADS C/D	601 (49.2%)	305 (25.0%)	243 (19.9%)	68 (5.6%)	4 (0.3%)
No category reported	182 (32.7%)	170 (30.5%)	92 (16.5%)	108 (19.4%)	5 (0.9%)

BI-RADS = Breast-Imaging Reporting and Data System.

anxiety was mostly reported by those who also had a family history of breast cancer and/or were concerned about the impact of breast density on the sensitivity of the screening test.²³ It is important to distinguish between clinical anxiety, which can be debilitating,³⁴ and normal anxiety, which appears to increase women's intention for future screening.²³

Most survey respondents (90%) supported continued notification of breast density in the program, even though only 65% of surveyed clients indicated that breast density notification meant that they felt informed to make decisions regarding their breast care. This may suggest that clients prefer to be given information even if they are not sure what to do. Other studies have reported that women value being informed of their breast density, educated about their own health, and participating in the decisions that arise from this understanding.¹⁸

The most commonly planned actions in response to breast density notification were self-breast examination (SBE), looking for more information about breast density and looking at other breast cancer risk factors. Self-breast examination is a common method of breast awareness advocated by Breast Cancer Network Australia (BCNA) and Cancer Australia. Around a third of the respondents planned to seek further advice from their GP; this response has been noted in other studies.^{23,35}

While the literature does not support evidence of mortality reduction with SBE, various groups encourage SBE, as part of 'breast awareness' and consumer advocacy.

Just over half of the survey respondents had heard of "breast density" prior to this study. At the time of the screening appointment confirmation, all respondents were provided with breast density information packs and the implications of high breast density with reduced screening test accuracy and increased breast cancer risk. The information packs were co-developed in close collaboration with consumers and stakeholders in focus group sessions developed by a marketing firm experienced in such collaborations, to optimise the messaging, education and health literacy presented in the client communications. A total of 28% learned of Breast Density from the information pack which was sent at the time of the appointment confirmation prior to the screening event and survey participation. In addition to the information pack, the results letter included a breast density description, a breast density brochure, and links to FAQs and

videos available on the BreastScreen SA website. A telephone hotline to medical officers was also available to field any queries or concerns. Despite the carefully curated information provided and the additional information available via the BreastScreen SA website and hotline, client knowledge and understanding of breast density as indicated by the survey was limited, particularly in relation to breast cancer risk. These results are consistent with Australian and international literature on this topic, despite significant education efforts.^{18,36} Knowledge and understanding would be expected to improve with routine breast density notification and repeated provision of information about breast density (as reported by²³), and with concurrent education and support for GPs to help facilitate discussions as required. Of interest, Darcey et al. reported that 14.1% of women did not know that they were notified they had dense breasts. This is consistent with the 13.7% of women in the current study that responded that their breast density was not reported. This suggests that a significant portion of women either do not have sufficient literacy level to understand or indeed even read the information provided.

The strength of this study is that it is the first study embedded in an Australian breast screening program that has notified clients of their breast density using automated measurement software (Volpara) and sought their responses to being provided with this information. The results presented here align well with other Australian studies. The study also adds the first Australian evidence about how clients respond to advice about having lower than average breast density.

The study has several limitations. While the survey response rate was reasonably high at 34.6%, without a comparison to non-respondents we cannot rule out the potential that we did not capture extensive diversity in BreastScreen SA clients. However, the similar findings to other studies provide reassurance that we have captured meaningful and representative data. As an opportunistic study attached to a program-led implementation of breast density notification, this study does not provide comparative data in clients not notified of their breast density, such as is currently being planned in a trial within the BreastScreen Queensland program. However, this study provides valuable self-reported information from active screening participants surveyed after receiving breast density notifications, rather than hypothetical scenarios as reported in previous studies.³⁷

One potential limitation regarding the question asking whether clients support the notification of reporting breast density is subject to potential cognitive dissonance bias as clients had already been informed.

Future studies could assess whether responses vary according to the screening round (first vs. subsequent) or over repeated screens; it is possible that anxiety would be highest during the first screening round, and/or the first notification of breast density, as reported in.²³ It would also be valuable to assess observed supplemental screening and GP engagement. This is important because, as reported from the Western Australia screening program, around half of women with dense breasts consulted with their GPs, and half of these were referred for supplemental screening (ultrasound or MRI).³⁵ This suggests that breast density notification by BreastScreen without offering a tailored screening option for clients with dense breasts could shift costs and services outside BreastScreen, with associated out-of-pocket costs for women potentially leading to inequalities in breast screening.

National stakeholders continue to discuss and review the role of breast density notification in the Australian screening program and as part of personalised screening.^{38,39} The Australian Commonwealth commenced a review into Breast Cancer Screening in 2024, which includes consideration of incorporating breast density into the screening pathway. Additional support for reporting on breast density in the screening programs has been provided by the Royal Australian and New Zealand College of Radiologists (RANZCR) with an updated Breast Density Position Statement (2023), which recommends that whilst a future risk-based model for breast cancer screening is being developed, RANZCR recommends mandating the reporting of breast density in both screening and diagnostic settings in Australia and New Zealand. It is also noted that BreastScreen Australia is also reviewing its current breast density position statement.

Meanwhile, there is strong advocacy and evidence that women feel a right to know to be informed of their breast density. The complexity lies in balancing this with equitable individual, health-economic and broader health-service considerations. For South Australians who participate in the breast screening program, breast density notification has subsequently been approved for statewide implementation. An announcement was made by the Minister for Health and Wellbeing, Hon Chris Picton on 28 July 2023.⁴⁰

In conclusion, this study indicates that breast density notification is likely to be well-received and valued by most screening participants. There is a proportion of clients for whom further effort is required to refine information and advice so that their needs are better addressed. It may be that some proportion of clients would only respond positively if BreastScreen concurrently offered more personalised screening protocol based on breast density, particularly for clients with higher breast density who are notified that this may have affected the accuracy of their screening test.

Participant consent

All survey participants provided written consent prior to participation. Clients participating in screening provide consent to be screened and for these data to be used in research that benefits women in breast screening and the breast screening program.

Data availability statement

The data that support these findings are held by BreastScreen SA. These data are available upon reasonable request and with permission of BreastScreen SA.

Conflicts of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Ethics

This study was approved by the Central Adelaide Local Health Network Human Research Ethics Committee (HREC reference 13211).

Author contributions

Idea conceived by MR.

Design and implementation by MR, EK, CN, JS, SC.

Data analysis by LB.

Manuscript preparation and review LB, EK, CN, JS, SC, DR, MR.

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Author ORCIDs

Liz Buckley  <https://orcid.org/0000-0001-8980-1194>

Shona Crabb  <https://orcid.org/0000-0003-3651-2916>

Michelle Reintals  <https://orcid.org/0000-0001-8905-3843>

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Appendix A Supplementary data

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