BC CANCER BREAST SCREENING
Provincial Health Services Authority

BC Cancer Breast Screening
2022 Program Results

March 2024

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Appendix

1 – MESSAGE

Message from the Medical Director

Despite the slow but steady recovery of screening volumes post-COVID 19 pandemic, screening sites have now reached pre-pandemic volumes. Initiatives such as the Cancer Doesn't Wait Campaign encourage patients who had deferred screening due to the pandemic to resume routine appointments.

May 2022 saw the introduction of the High-Risk Surveillance Program, tailored for patients with ADH, ALH, and LCIS diagnoses. This program facilitates diagnostic mammogram referrals for high-risk patients. Collaborating with a Doctors of BC working group, the screening program refined provider result letters for better integration with electronic medical report systems.

The migration of data to the new patient database, CASCADE, has been an ongoing effort, keeping our data teams engaged. Research teams are actively exploring the potential of emerging technologies, including artificial intelligence (AI), to address anticipated challenges. Notably, BC Cancer AI breast screening research was presented at the Radiological Society of North America annual meeting in Chicago in November 2022.

In 2023, the Breast Screening Program underwent significant transformations, marked by the appointment of a new medical director (myself, succeeding Dr. Colin Mar) and the addition of two operations directors—Ms. Rableen Nagra and, as an interim parental leave replacement, Ms. Davina Gallagher for Ms. Janette Sam. Embracing this new leadership role, I eagerly anticipate the challenges and opportunities that come with the position.

Looking ahead, collaboration with Indigenous Health aims to ensure a culturally safe experience for all screening attendees. The implementation of a newly developed Home Reporting Policy provides flexibility and aims to enhance retention and reduce burnout among screening radiologists committed to early detection.

Thank you to everyone on the breast screening team for your commitment to the program. I look forward to working with all of you as we continue to improve patient outcomes.

Dr. Charlotte Yong-Hing

Message from the Screening Operations Director

Thinking about the coast Salish teachings that were gifted to us by knowledge keeper Sulksun, I think, **Tee ma thit** "Do Your Best" and **Nuts a maht** "We are One" are very much in line with the collaborative work that has occurred within the breast screening program this year. Coast Salish teachings offer guidance on doing our best and working together, and on how we can show up in the work. When we pull our own weight and work collaboratively we inspire others to do their best too.

It has been a very productive year - demand for breast screening has been high. The last year has seen a number of innovative initiatives that I have been fortunate to have either been a part of or see the seeds of the initiatives grow.

As Dr Yong-Hing stated, a High Risk Surveillance Program was introduced in May 2022 that manages a facilitated referral for a diagnostic mammogram for these high-risk clients and a comprehensive Cancer Doesn't Wait Campaign was implemented. This campaign included TV advertisements, new patient videos, online advertising and a campaign landing page to combat an anticipated lull in recall notices released in March and April which coincided with the screen suspension two years prior.

The screening programs participated with a Doctors of BC working group to refine provider result letters, allowing letters to be more easily managed by provider electronic medical report systems.

This year saw great connection and collaboration in the breast screening program at all levels - ongoing webinars occurred with the goal of refining practices and reducing data entry errors; a central repository website was identified as an accessible way to house program documents and communications; a quarterly quality improvement touchbase process with MI leaders in all Health Authorities and Community Imaging Clinics was established, where metrics are reviewed and improvement plans developed. With the assistance of the Screening Programs Team, the Hereditary Cancer Program referral form, Provider Referral Slip and Breast screening Referral Algorithm were updated. Updates included the addition of new gene variants, new eligibility requirements and booking options.

There are also exciting initiatives planned for next year including a 'train the trainer' project to increase screening knowledge of community healthcare teams in Indigenous communities, so that they can engage and support their community and in turn increase the number of community members screened. An initiative to standardize the approach of culturally safe mobile screening visits to Indigenous communities is underway.

As I am currently interim director of operations for breast and lung screening, I would like to thank Rableen Nagra for allowing me to support her portfolio in her absence, and also Janette Sam for the tireless support she has provided me.

Davina Gallagher

2 – EXECUTIVE SUMMARY

BC Cancer celebrates the achievements of the Breast Screening Program, a trailblazing initiative that, in its 34th year, remains the first population-based breast cancer screening program in Canada. Since its inception in 1988, the program has conducted over 7,092,163 screening mammograms, leading to the detection of 33,868 breast cancers.

In 2020, a 10-week screening suspension due to COVID-19 resulted in decreased participation, with a subsequent rebound to 47% participation in 2022. However, staffing challenges continue to cause prolonged wait times at various sites across the province.

A heartfelt expression of gratitude is extended to Dr. Colin Mar, the former Medical Director of the BC Cancer Breast Screening Program, for his dedicated service from 2016 to 2023. Dr. Mar's influence extended beyond the provincial level, as he actively contributed to the Canadian Breast Cancer Screening Network and played a pivotal role in formulating "The Pan-Canadian Framework for Action to Address Abnormal Call Rates in Breast Cancer Screening." As the chair of the Screeners Advisory Committee, he facilitated the transition from paper-based to electronic reporting. He also revised individual screener statistics to include personalized feedback and practice development prescriptions. Dr. Mar adeptly guided the program through the challenges of the COVID-19 pandemic, collaborating with the Canadian Society of Breast Imaging and the BC Radiological Society to host the first virtual forum in the spring of 2020 when most conferences were being canceled. In the post-pandemic era, he has focused on encouraging patients to resume screening and implemented initiatives to enhance capacity, aligning with national benchmark wait times. Under his leadership, the screening program introduced the new data management system CASCADE, successfully migrating data from the previous system, Reflections. In 2022, Dr. Mar organized the first post-COVID hybrid Forum, blending in-person attendance with virtual participation. He initiated revisions to the blind/joint review process, an ongoing effort. Throughout his tenure as Medical Director, Dr. Mar served as the program's spokesperson, delivering numerous lectures, presentations, media interviews, and contributing to five publications. His invaluable contributions have left an enduring impact on the BC Cancer Breast Screening Program.

3 – SCREENING RECOMMENDATIONS FOR PEOPLE IN BRITISH COLUMBIA

BC's provincial breast screening recommendations are consistent with current evidence-based research findings, effective Feb 4, 2014. Recommendations encompass the use of mammography, MRI, breast self-examination, and clinical breast examination to screen for breast cancer. Information about the BC breast screening recommendations may be found in Appendix 2, 2022 Breast Screening Program Screening Recommendations, and online at www.bccancer.bc.ca/screening/breast.

4 – ABOUT THE BREAST SCREENING PROGRAM

Regular breast cancer screening is an important part of an individual's health routine. Here in BC we have some of the best survival outcomes in Canada for those individuals who do get breast cancer. This success is largely due to improved cancer treatments and participation in breast cancer screening.

Obtaining a regular mammogram is a key component of early detection – regular breast cancer screening can find cancer when it is small, which means:

- There may be more treatment options.
- It is less likely to spread.
- There is a better chance of treating the cancer successfully.

An individual's risk of breast cancer increases with ages; over 80% of breast cancers in BC are found in individuals 50 years and older. BC Cancer is committed to finding breast cancers early through breast cancer screening by its population based program. The Breast Screening Program utilizes standard two-view bilateral mammography (x-ray of the breast) for breast cancer screening. Individuals ages 40-74 may self-refer to the program; however it is recommended that by age 50 average risk individuals have a screening mammogram every two years. Individuals are not eligible for a screening mammogram in BC if they have had breast cancer or breast implants, or if they currently have breast symptoms requiring a diagnostic investigation. These individuals must speak with their primary care provider and may be referred for a diagnostic mammogram.

4.1 Centres and Mobile Services

There are 37 fixed centres across the province, and three mobile vans that visit over 170 smaller BC communities, including many First Nations communities. Mobile schedules are posted on the Breast Screening Program website (www.bccancer.bc.ca/screening/breast) and are sent to local health professionals.

4.2 The Screening Process

The Screening Process is illustrated in Figure 3.1 at the end of this section. The process consists of four stages:

1. Identify and invite the target population for screening.
2. Conduct the screening examination.
3. Investigate any abnormalities identified on screening.
4. Issue a screening reminder at the appropriate interval.

4.3 FAST TRACK – Facilitated Referral to Diagnostic Imaging

On average approximately 9% of participants who attend for screening will require additional diagnostic testing. Recognizing the importance of timely follow up, the Fast Track Referral System was established in 1999. The Fast Track system facilitates referral for participants who require further testing.

4.4 Fast Track Overview

- At the time of screening, participants are informed that if further tests are required, they will be called directly by a diagnostic facility to book their appointment.
- If further testing is required i.e. additional mammographic views or breast ultrasound, the particiant is booked at the Fast Track diagnostic clinic closest to the screening site, usually at the same location.
- The Breast Screening Program images and results are transferred to the diagnostic office prior to the appointment.
- Breast Screening Program notifies the particiant's health care provider where their patient has been referred for additional testing.
- The diagnostic facility makes every effort to provide an appointment within one week of receiving the referral.
- Standardization of the Fast Track referral system ensures that all particiants benefit from the shortened time between an initial abnormal screening result and the first appointment for diagnostic assessment.

4.5 Program Evaluation

Data is collected and analyzed on an ongoing basis to monitor the program's effectiveness and to identify areas for improvement. Breast Screening Program evaluation indicators, quality standards and systems are based on national and international guidelines and recommendations, including the 3rd edition of the *Report from the Evaluation Indicators Working Group: Guidelines for Monitoring Breast Cancer Screening Program Performance,* published in February 2013[1].

Results of this analysis are presented in the "PROGRAM RESULTS" section of this report (Section 5). Age-specific breast cancer incidence and mortality rates are provided by the BC Cancer Registry.

[1] Canadian Partnership against Cancer. Report from the Evaluation Indicators Working Group: Guidelines for Monitoring Breast Cancer Screening Program Performance (3rd edition). Toronto: Canadian Partnership Against Cancer; February, 2013

4.6 Quality Assurance

A team of Medical Physicists, a Provincial Practice Leader for Mammography Technologists, and a Quality Management Coordinator are dedicated to quality assurance at all Breast Screening Program centres. This team supports imaging quality assurance and provides professional direction in equipment selection, acceptance testing, troubleshooting, quality control testing and accreditation at screening centres around the province. The Program also supports continuing education for radiologists and technologists.

The breast screening workforce is comprised of certified technologists from across BC who are trained and experienced in breast imaging. The Provincial Professional Practice Leader has developed various initiatives to support the professional development of our dedicated technologists, including:

- Certificate in Breast Imaging scholarship program;
- Educational Webinars throughout the year;
- A Quarterly Technologist Newsletter;
- An educational event at the biennial Breast Screening Program Forum with continuing medical education (CME) credits that is also open to BCIT students comprised of up-to-date topics and speakers that are relevant to the profession;
- Breast Screening Program Mammography Teaching Sets for Technologists for CME credits;
- Mammography positioning and Patient Care In-Service presentations (CME credits) at the centres;
- A comprehensive Breast Screening Program Technologist Manual with information to support a technologist's day-to-day duties.

Quality assurance and monitoring is a critical component of an organized screening program. Standards and systems in the Breast Screening Program are developed based on guidelines and recommendations from the Canadian Association of Radiologists (CAR), Public Health Agency of Canada (PHAC), the Canadian Association of Medical Radiation Technologists (CAMRT), the Breast Screening Program Quality Assurance Support Group, and the scientific literature.

Accreditation: Accreditation is the certification of competence in an area of expertise. CAR Mammography Accreditation is mandatory for all Breast Screening Program Centres. Centres participate in accreditation renewals every three years and are required to have an annual update. The team provides support and guidance for centres as they pursue accreditation. Accredited sites display a CAR certificate for all particiants attending the service to view.

Image Quality Assurance: The Breast Screening Program Quality Assurance Support Group provides leadership and technical support to centres for their quality control practices which are standardized and monitored regularly. All centres undergo regular annual equipment testing by a Program Medical Physicist and are also supported through site visits, training, and comprehensive manuals. The team also provides support for centres during equipment replacement.

4.6 Quality Assurance (continued)

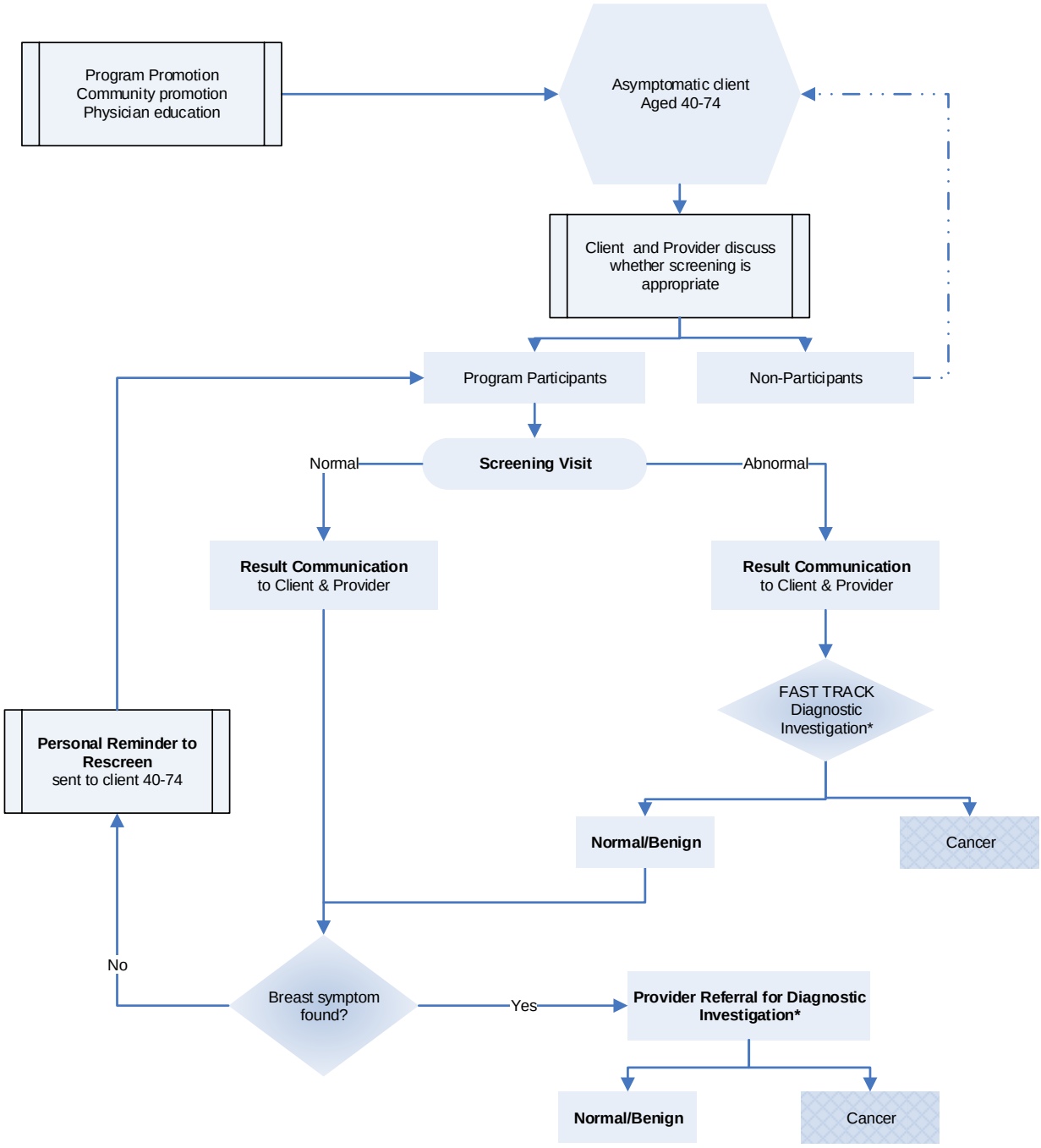
Based upon best practices, the program has developed and implemented a comprehensive, harmonized quality control program specific for digital mammography equipment, as well as digital mammography-specific phantoms and a web based 'mQc' program. Technologists are trained to perform these quality control tests through site visit demonstrations. Access to the QC website allows technologists and physicists to review test results on site or remotely. The Breast Screening Program continues to work with other provinces to champion standardization of quality control programs for digital mammography.

4.7 Regular Promotion and Education Activities

Ongoing promotion activities include:

- Production of new promotional tools, such as brochures, posters, marketing giveaways, bookmarks and postcards that effectively communicate the benefits of mammography.
- Working with ethnic and First Nations groups to develop customized materials and culturally-sensitive approaches to increase understanding and interest in screening.
- Regular media advertisements to promote the mobile mammography service.
- A "@BCCancer" Twitter account that promotes relevant information about cancer screening including upcoming mobile visits in communities around the province.
- A Facebook page (@BCCancerScreening) that promotes relevant information about breast screening including upcoming mobile visits, an open platform for information sharing and video promotions.
- A website (www.bccancer.bc.ca/screening/breast) to support informed decision making about screening.
- Regular presence at health fairs and events throughout the province by the BC Cancer Prevention group.

FIGURE 1: SCREENING PROCESS OVERVIEW



* Breast Screening obtains diagnostic investigation information from sources such as Medical Services Plan, surgeons, hospitals and BC Cancer Registry on women who consent to follow up.

5.0 — 2022 PROGRAM RESULTS

The program results section provides outcomes for various indicators including coverage, participation, follow-up, quality of screening, detection, and disease extent at diagnosis. The indicators used are adapted from the Canadian Partnership Against Cancer Guidelines for Monitoring Breast Cancer Screening Program Performance[2].

The program results include outcomes where applicable for particiants who have indicated they have a family history (higher than average risk individuals). In section 5.8, the Breast Screening Program performance measures are presented against the national targets set for Canadian breast cancer screening programs.

[2] http://www.cancerview.ca/idc/groups/public/documents/webcontent/guideline_monitoring_breast.pdf

5.1 – RECRUITMENT AND RE-SCREENING

Screening Volume

The Breast Screening Program provided 254,515 examinations in 2022. During this period 38,140 (14.9%) of those examinations were provided to first time attendees. First time attendees are categorized as those who have not had a screening mammogram in the previous 10 year period. The program calculation for new screenees changed in 2022 resulting in a higher proportion of first time screenees.

Figure 2 shows that the total number of exams provided by Breast Screening Program in 2022 decreased slightly compared to 2021. 2022 volumes were lower due to ongoing post COVID 19 staffing issues.

FIGURE 2: ANNUAL SCREENING VOLUME YEARS: 2018-2022

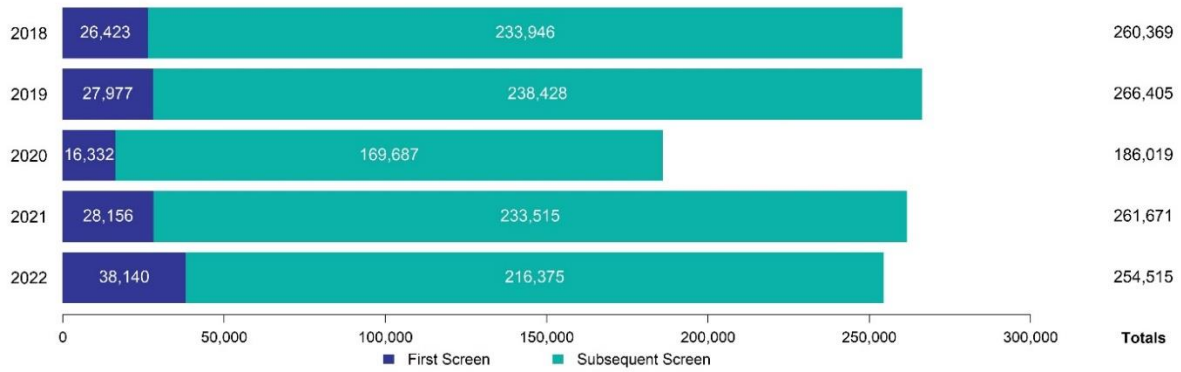
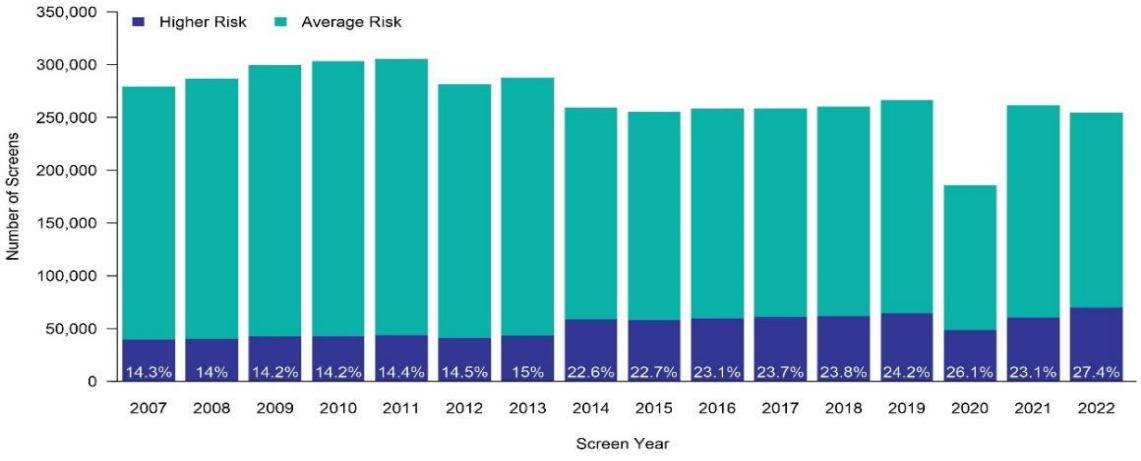


Figure 3 shows the percentage of particiants who are at higher risk increased to 27.4% of the total number of individuals screened in 2022.

FIGURE 3: ANNUAL SCREENING VOLUME BY RISK AND SCREEN YEARS: 2007-2022



Notes

1. Breast Screening Program data extraction date: January 31, 2024.

Volume by Health Service Delivery Area: 2022

The age distribution of all exams and first exams performed in 2022 by Health Services Delivery Areas (HSDA) are displayed in Table 1.

- The majority of exams (65%) are performed for individuals between ages 50 to 69 in all HSDAs. This is similar to 2021.
- A screening mammogram is considered as the baseline screen (first exam) if the participant has not been screened in the last 10 years.
- The majority of first time mammograms were for those under 50 years of age; however, there are regional variations ranging from 37% in East Kootenay and Kootenay Boundary to 61% of first time attendees being under 50 years of age in Fraser North and Vancouver.

TABLE 1: VOLUME BY HEALTH SERVICE DELIVERY AREA YEAR: 2022

		Age Distribution of All Exams			First Exams		Age Distribution of First Exams		
HSDA	Total Exams	<50	50-69	70+	n	% Total	<50	50-69	70+
East Kootenay	3,661	12%	68%	20%	557	15%	37%	57%	5%
Kootenay Boundary	3,952	12%	69%	20%	587	15%	37%	57%	6%
Okanagan	22,838	12%	67%	21%	3088	14%	41%	53%	7%
Thompson Cariboo Shuswap	11,871	13%	67%	20%	1407	12%	44%	51%	5%
Interior	42,322	13%	67%	20%	5639	13%	41%	53%	6%
Fraser East	13,850	19%	64%	16%	2053	15%	56%	39%	5%
Fraser North	36,374	22%	65%	14%	5840	16%	61%	36%	3%
Fraser South	40,291	22%	63%	15%	6236	15%	59%	37%	4%
Fraser	90,515	21%	64%	15%	14129	16%	59%	37%	4%
Richmond	12,560	20%	65%	15%	2050	16%	58%	40%	3%
Vancouver	33,746	22%	63%	15%	5524	16%	61%	36%	4%
North Shore / Coast Garibaldi	18,079	20%	63%	17%	2927	16%	57%	39%	4%
Vancouver Coastal	64,385	21%	64%	16%	10501	16%	59%	37%	4%
South Vancouver Island	22,135	14%	66%	20%	3207	14%	45%	50%	6%
Central Vancouver Island	16,640	12%	65%	23%	2141	13%	41%	52%	7%
North Vancouver Island	7,365	12%	67%	21%	987	13%	40%	53%	6%
Vancouver Island	46,140	13%	66%	21%	6335	14%	43%	51%	6%
Northwest	2,919	18%	66%	16%	419	14%	50%	46%	3%
Northern Interior	6,170	14%	70%	15%	781	13%	48%	48%	3%
Northeast	1,772	16%	71%	13%	255	14%	45%	51%	4%
Northern	10,861	16%	69%	15%	1455	13%	48%	48%	3%
Unknown	292	17%	64%	19%	81	28%	33%	57%	10%
British Columbia	**254,515**	**18%**	**65%**	**17%**	**38,140**	**15%**	**53%**	**42%**	**4%**

Notes

1. Breast Screening Program data extraction date: January 31, 2024
2. A new row named 'Unknown' is added to this table because of clients who have unknown geographic information.

Volume by Health Service Delivery Area: 2022 (continued)

The age and volume distribution of all screens performed for particiants who self-identified as having a family history (higher risk) or other high risk factor are displayed in table 2.

- The majority of higher risk exams (80%) are performed for individuals between ages 50 to 74 across all HSDAs.

TABLE 2: AGE AND VOLUME DISTRIBUTION FOR HIGHER RISK IDIVIDUALS BY HEALTH SERVICE DELIVERY AREA: 2022

			Age Distribution of Higher Risk Exams			
HSDA	**Number of Higher Risk Exams**	**% Higher Risk Exams**	**<40**	**40-49**	**50-74**	**75+**
East Kootenay	1113	30%	1%	10%	83%	6%
Kootenay Boundary	1118	28%	1%	10%	83%	7%
Okanagan	7089	31%	0%	10%	83%	7%
Thompson Cariboo Shuswap	3673	31%	0%	9%	84%	7%
Interior	12993	31%	0%	10%	83%	7%
Fraser East	3894	28%	1%	14%	80%	5%
Fraser North	9073	25%	0%	16%	79%	5%
Fraser South	9675	24%	1%	16%	78%	6%
Fraser	22642	25%	1%	15%	79%	5%
Richmond	2983	24%	1%	14%	80%	6%
Vancouver	8474	25%	1%	17%	76%	5%
North Shore / Coast Garibaldi	5090	28%	1%	15%	79%	5%
Vancouver Coastal	16547	26%	1%	16%	78%	5%
South Vancouver Island	6894	31%	1%	12%	82%	6%
Central Vancouver Island	5080	31%	0%	9%	83%	8%
North Vancouver Island	2360	32%	1%	9%	84%	6%
Vancouver Island	14334	31%	1%	10%	82%	7%
Northwest	874	30%	0%	13%	82%	5%
Northern Interior	1870	30%	0%	12%	82%	5%
Northeast	494	28%	1%	15%	80%	4%
Northern	3238	30%	0%	13%	82%	5%
Unknown	81	28%	1%	12%	79%	7%
British Columbia	**69,835**	**27%**	**< 1%**	**13%**	**80%**	**6%**

Notes

1. Breast Screening Program data extraction date: January 31, 2024.
2. A new row named 'Unknown' is added to this table because of clients who have unknown geographic information.

Screening Participation

The percentage of BC individuals who have completed a Breast Screening Program screening mammogram at least once within 30 months as a proportion of the prevalence adjusted population.

The biennial screening participation rates are shown by HSDA for each age group in Table 3.

- In the 30-month period between July 1, 2020 and December 31, 2022, 333,964 individuals ages 50-69 participated in the Breast Screening Program.
- Participation improved compared with July 1, 2019 and December 31, 2021 (47% compared to 45% previously).
- The North Shore/Garibaldi, Vancouver and Fraser North HSDAs had the highest participation rates at 50%.

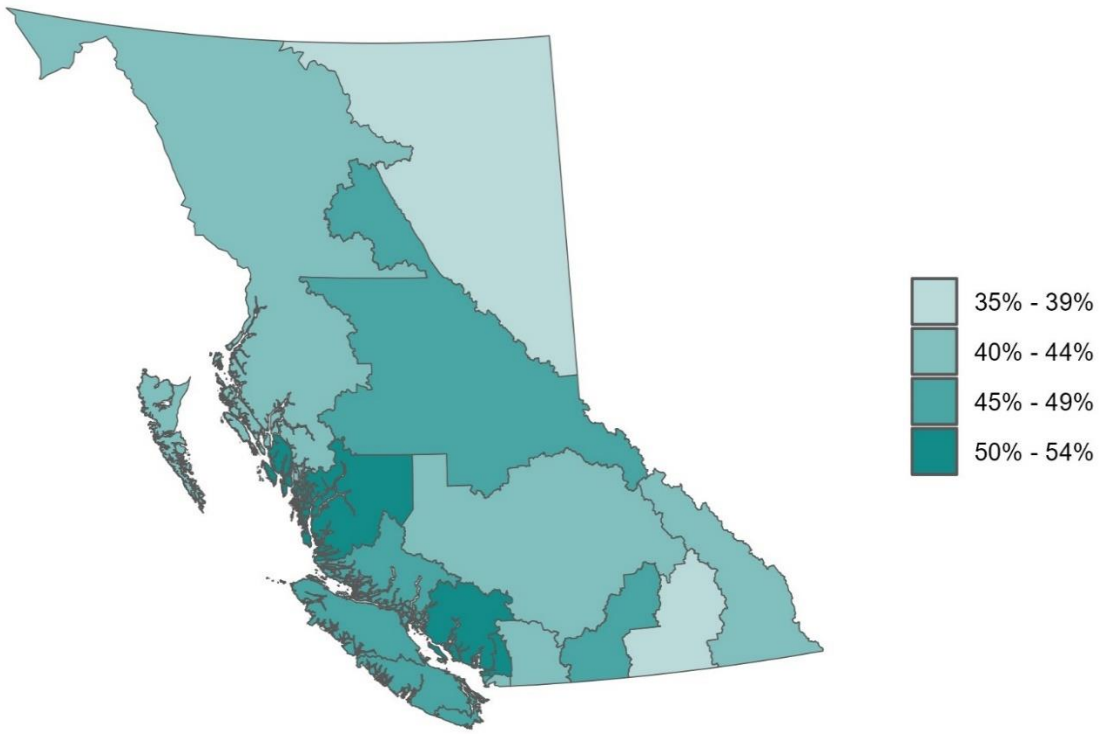
TABLE 3: REGIONAL 30-MONTH PARTICIPATION RATES BY 10-YEAR AGE GROUPS ENDING DECEMBER 31, 2022 INCLUSIVE

	10-Year Age Groups					
HSDA	**40-49**	**50-59**	**60-69**	**70-74**	**Ages 50-69**	**Ages 50-74**
East Kootenay	15%	37%	49%	49%	**43%**	**44%**
Kootenay Boundary	14%	33%	43%	42%	**39%**	**39%**
Okanagan	20%	42%	54%	56%	**48%**	**50%**
Thompson Cariboo Shuswap	20%	40%	48%	49%	**44%**	**45%**
Interior	19%	40%	50%	52%	**46%**	**47%**
Fraser East	22%	38%	46%	47%	**43%**	**43%**
Fraser North	26%	46%	54%	51%	**50%**	**50%**
Fraser South	25%	43%	46%	43%	**45%**	**44%**
Fraser	25%	43%	49%	47%	**46%**	**46%**
Richmond	26%	45%	54%	59%	**49%**	**50%**
Vancouver	25%	49%	51%	55%	**50%**	**51%**
North Shore/Coast Garibaldi	25%	47%	54%	50%	**50%**	**50%**
Vancouver Coastal	25%	48%	52%	54%	**50%**	**50%**
South Vancouver Island	20%	45%	52%	52%	**49%**	**49%**
Central Vancouver Island	20%	39%	53%	55%	**47%**	**48%**
North Vancouver Island	18%	40%	53%	54%	**47%**	**48%**
Vancouver Island	20%	42%	53%	54%	**48%**	**49%**
Northwest	21%	41%	45%	46%	**43%**	**44%**
Northern Interior	18%	41%	49%	51%	**45%**	**46%**
Northeast	12%	33%	39%	40%	**36%**	**37%**
Northern	17%	39%	46%	48%	**43%**	**43%**
Unknown	NA	NA	NA	NA	**NA**	**NA**
British Columbia	**23%**	**43%**	**51%**	**51%**	**47%**	**48%**

Notes

1. Population data source: P.E.O.P.L.E. 2022 population projections (Oct 2022), BC Stats, Ministry of Technology, Innovation and Citizens' Services, Government of the Province of British Columbia.
2. Breast Screening Program data extraction date: January 31, 2024

FIGURE 4: BIENNIAL SCREENING PARTICIPATION BY INDIVIDUALS AGES 50-69 OVER 30-MONTH PERIOD BETWEEN JULY 1, 2020 AND DECEMBER 31, 2022



Notes

1. Population data source: P.E.O.P.L.E. 2022 population projections (Oct 2022), BC Stats, Ministry of Technology, Innovation and Citizens' Services, Government of the Province of British Columbia.
2. Breast Screening Program data extraction date: January 31, 2024

Bilateral mammography may be used for both screening and diagnostic purposes. A proportion of the bilateral mammography services paid through the Medical Services Plan (MSP) are directly related to screening. Data on bilateral mammography utilization were obtained from the MSP. Figure 5 shows the proportion of individuals receiving bilateral mammography services through either the Breast Screening Program or MSP over a 30 month period.

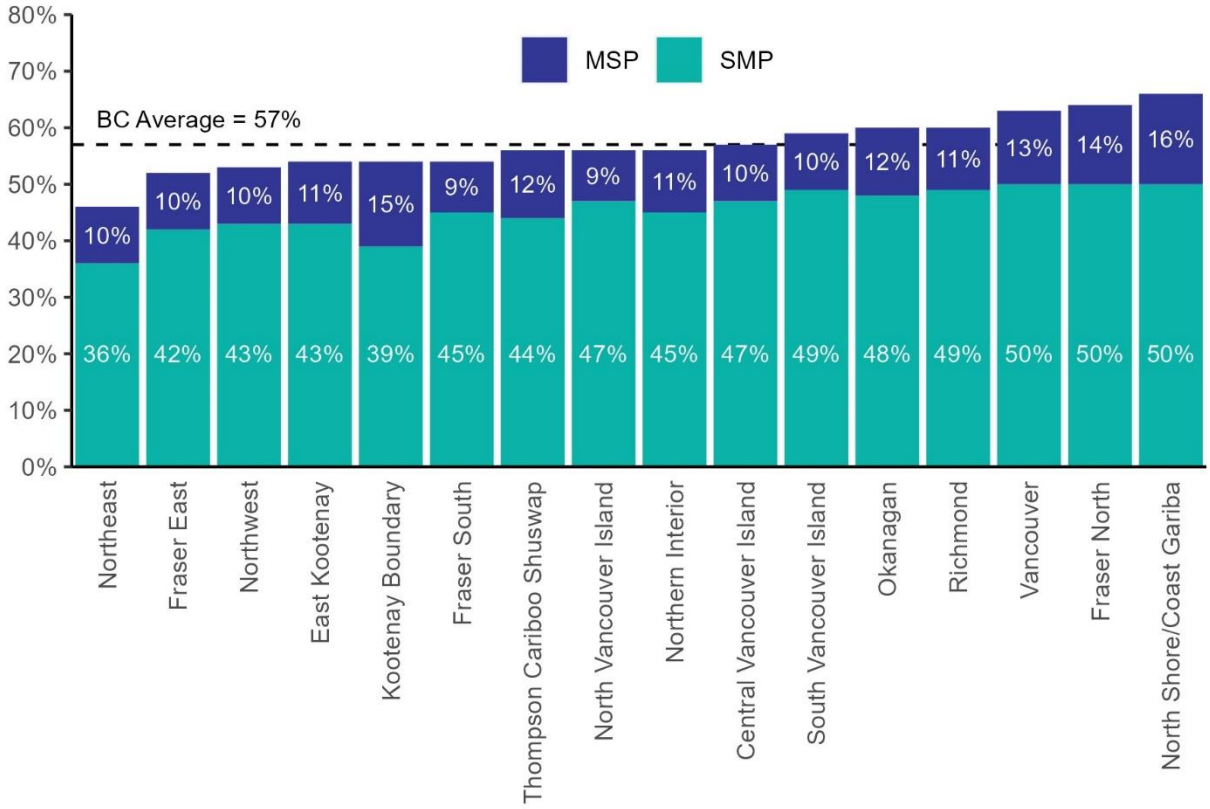
BC Cancer Breast Screening now recommends surveillance with annual mammography through diagnostic imaging. The program facilitates a diagnostic bilateral mammogram referral for breast cancer surveillance for individuals at increased risk, specifically due to a prior tissue diagnosis of, Atypical Ductal Hyperplasia (ADH), Atypical Lobular Hyperplasia (ALH) or Classical Lobular Carcinoma In Situ (LCIS).

Some individuals may have had bilateral mammograms through both the Breast Screening Program and MSP. Thus, the proportions presented here may be slightly higher than the actual figures due to this possible duplication.

Screening Participation (continued)

- During the 30-month reporting period, 57% of BC individuals ages 50 to 69 received bilateral mammography services through either the screening program or MSP.
- The percentage of individuals ages 50 to 69 receiving bilateral mammography ranged from 46% to 66% across the province.
- Overall, the Breast Screening Program provided 80% of the bilateral mammography services for this age group.

FIGURE 5: BILATERAL MAMMOGRAPHY UTILIZATION BY INDIVIDUALS AGES 50-69 IN BC BETWEEN JULY 1, 2020 AND DECEMBER 31, 2022 INCLUSIVE



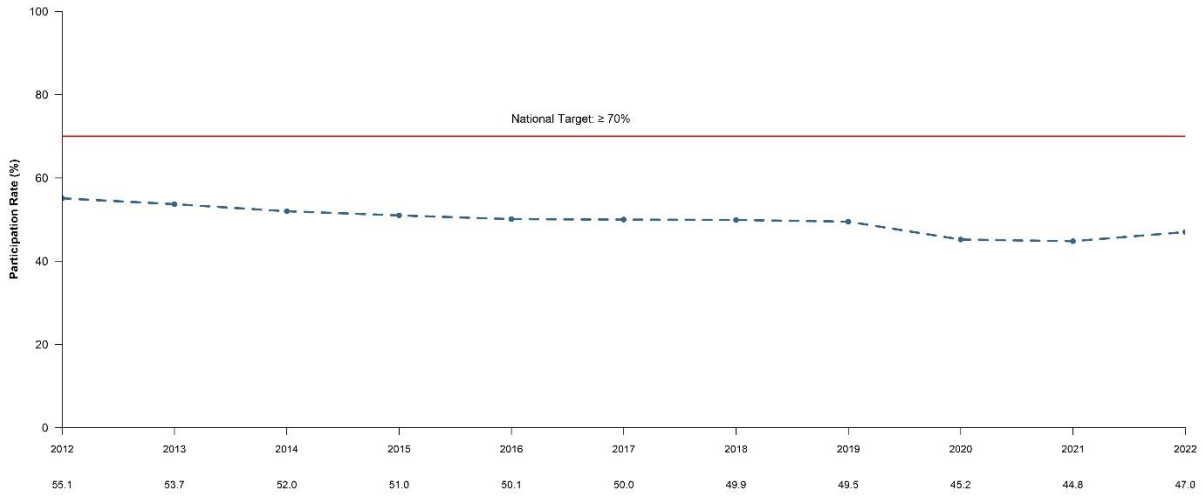
Notes

1. MSP data includes only MSP Fee-For-Service item 8611 on female patients; all out of province claims are excluded.
2. MSP data contains payment date to June 30, 2021 for services provided between July 1, 2020 and December 31, 2022.
3. Breast Screening Program data includes single and multiple screens per individual provided between July 1, 2020 and December 31, 2022.
4. Population data source: P.E.O.P.L.E. 2022 population projections (Oct 2022), BC Stats, Ministry of Technology, Innovation and Citizens' Services, Government of the Province of British Columbia.
5. Breast Screening Program data extraction date: January 31, 2024

Trends in Screening Participation

There are 37 fixed and 3 mobile mammography centres enabling all BC individuals to have reasonable access to screening services. Participation has been ranging between ~50-55% between 2012 to 2022. In 2020 there was a drop in participation due in part to the COVID-19 10 week screening suspension. As the program recovers from COVID 19 suspension, the participation rate has begun to recover to 47% in 2022 from 45% in 2021.

FIGURE 6: BREAST SCREENING PROGRAM PARTICIPATION RATES (%) FOR INDIVIDUALS AGES 50-69 BY CALENDAR YEAR: 2012– 2022



Notes

1. Breast Screening Program data extraction date: January 31, 2024.

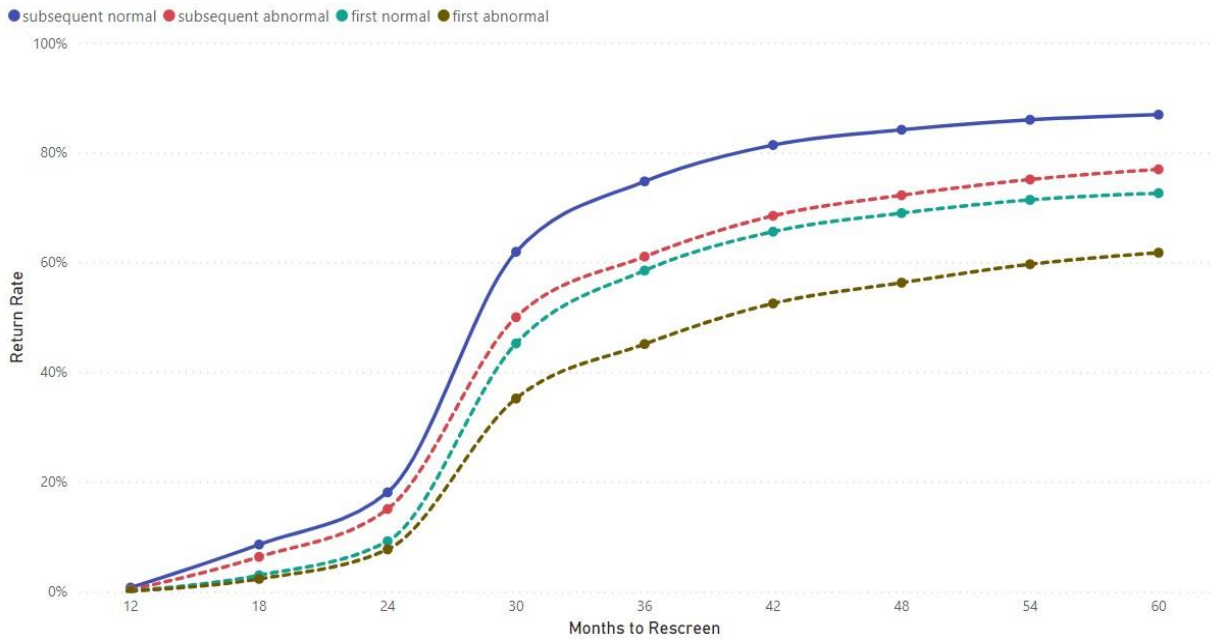
Screening Return Rates

Retention rate is the percentage of screen eligible individuals that had a subsequent Breast Screening Program screening mammogram within 30 months of their previous program mammogram.

Regular attendance for screening is important in order to benefit from a reduction in breast cancer mortality. The program sends recall reminders to participants when they are due for their next screening interval. A second letter is sent if there is no appointment scheduled within four to six weeks of the first letter. A third letter is sent the following year if there is no response.

Figure 7-9 and Table 5-7 show return rates for participants ages 40 to 49, 50 to 69 and 40-74 respectively, who attended for breast screening between 2019 and 2021. By 24 months, when program recall mailing is active, participants with normal results are more likely to respond to the recall letters than participants who previously had an abnormal result. First time attendees have a lower rate of return than those who have had two or more visits already. By 30 months, 56% of average risk participants with a previous normal result and 42% of participants with a previous abnormal result had returned to screening (Table 7). The Program has developed support material for the technologists to share with participants at their first appointment to encourage them to return when they are recalled for future screening.

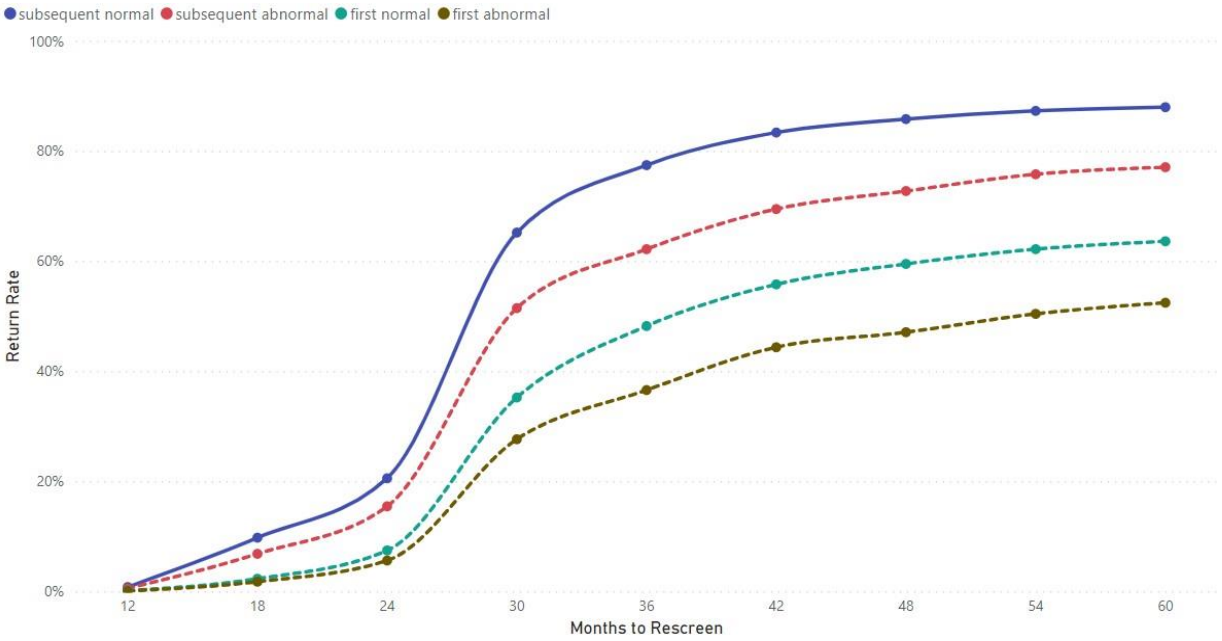
FIGURE 7: SCREENING RETURN RATES FOR WOMEN AGES 40-49: 2019– 2021



Notes

1. Breast Screening Program data extraction date: January 31, 2024.

FIGURE 8: SCREENING RETURN RATES FOR WOMEN AGES 50-69: 2019 – 2021



Notes

1. Breast Screening Program data extraction date: January 3, 2024.

TABLE 5: SCREENING RETURN RATES FOR PARTICIPANTS AGES 40-49: 2019 – 2021

	First Screen		Subsequent Screen		Overall	
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal
Total Number to be Re-screened	27,441	6,952	53,894	6,374	**81,335**	**13,326**
Returned by 12 months	0%	0%	1%	0%	**1%**	**0%**
18 months	3%	2%	9%	6%	**7%**	**4%**
24 months	9%	8%	18%	15%	**15%**	**11%**
30 months	45%	35%	62%	50%	**56%**	**42%**
36 months	59%	45%	75%	61%	**69%**	**53%**

Notes

1. Breast Screening Program data extraction date: January 31, 2024
2. The last screen of each client in the time range was used to calculate the retention rates.

TABLE 6: SCREENING RETURN RATES FOR PARTICIPANTS AGES 50-69: 2019 – 2021

	First Screen		Subsequent Screen		Overall	
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal
Total Number to be Re-screened	22,663	6,257	294,811	24,633	**317,474**	**30,890**
Returned by 12 months	0%	0%	1%	1%	**1%**	**0%**
18 months	2%	2%	10%	7%	**9%**	**6%**
24 months	7%	6%	21%	15%	**20%**	**13%**
30 months	35%	28%	65%	51%	**63%**	**47%**
36 months	48%	37%	77%	62%	**75%**	**57%**

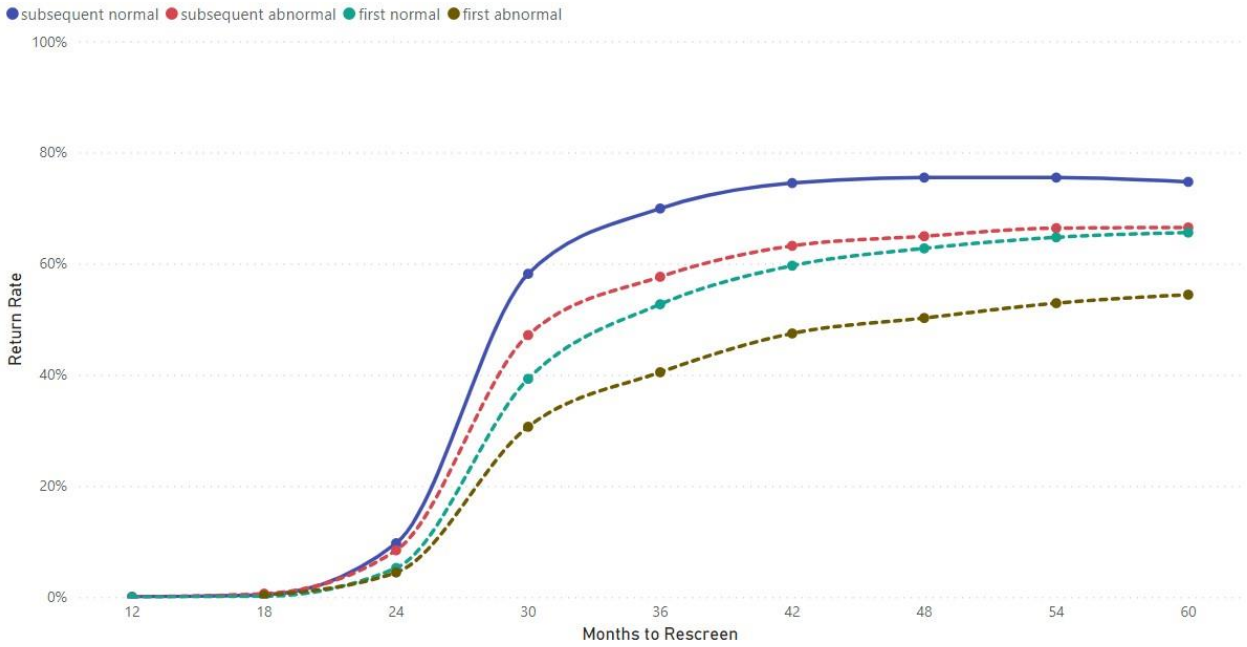
Notes

1. Breast Screening Program data extraction date: January 31, 2024
2. The last screen of each client in the time range was used to calculate the retention rates.

Screening Return Rates by Risk Group

Figure 10 shows a graph of return rates for participants ages 40 to 74 who self-identified as having a family history of breast cancer (higher risk) and attended for breast screening between 2019 and 2021. Participants in this cohort are recommended to screen annually rather than every two years. By 18 months, 48% of participants with a previous normal result and 30% of participants with a previous abnormal result had returned to screening (Table 8). By 30 months, 68% of higher risk participants who had a normal screen have returned for screening compared with 56% of average risk participants .

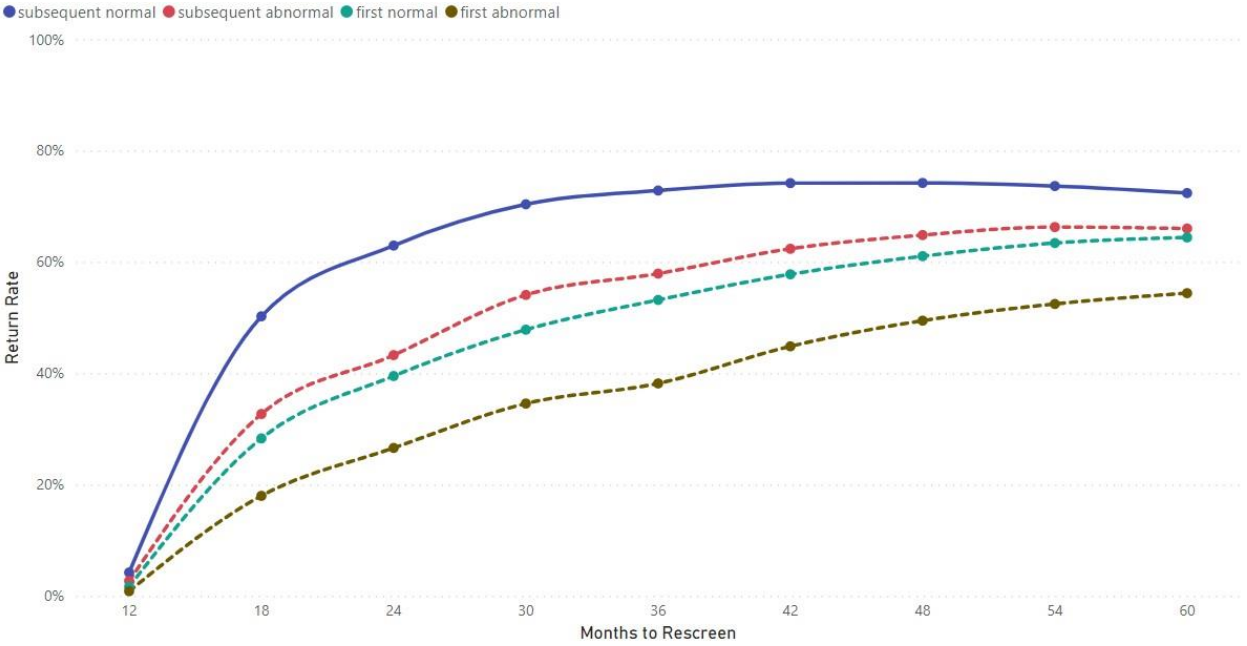
FIGURE 9: RETURN RATES FOR AVERAGE RISK PARTICIPANTS AGES 40-74 BY FIRST/SUBSEQUENT SCREEN AND SCREEN RESULT: 2019 – 2021



Notes

1. Breast Screening Program data extraction date: January 31, 2024

FIGURE 10: RETURN RATES FOR HIGHER RISK PARTICIPANTS AGES 40-74 BY FIRST/SUBSEQUENT SCREEN AND SCREEN RESULT: 2019 – 2021



Notes

1. Breast Screening Program data extraction date: January 31, 2024

TABLE 7: SCREENING RETURN RATES FOR AVERAGE RISK PARTICIPANTS AGES 40-74: 2019 – 2021

	First Screen		Subsequent Screen		Overall	
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal
Total Number to be Re-screened	47,227	12,291	336,356	28,744	**383,583**	**41,035**
Returned by 12 months	0%	0%	0%	0%	**0%**	**0%**
18 months	0%	0%	0%	1%	**0%**	**1%**
24 months	5%	4%	10%	8%	**9%**	**7%**
30 months	39%	31%	58%	47%	**56%**	**42%**
36 months	53%	40%	70%	58%	**68%**	**52%**

Notes

1. Breast Screening Program data extraction date: January 31, 2024
2. The last screen of each client in the time range was used to calculate the retention rates

TABLE 8: RETURN RATES FOR HIGHER RISK PARTICIPANTS AGES 40-74: 2019 – 2021

	First Screen		Subsequent Screen		Overall	
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal
Total Number to be Re-screened	4,679	1,436	76,295	7,257	**80,974**	**8,693**
Returned by 12 months	2%	1%	4%	3%	**4%**	**2%**
18 months	28%	18%	49%	32%	**48%**	**30%**
24 months	39%	27%	62%	43%	**61%**	**40%**
30 months	48%	35%	69%	54%	**68%**	**50%**
36 months	53%	38%	72%	57%	**71%**	**54%**

Notes

1. Breast Screening Program data extraction date: January 31, 2024
2. The last screen of each client in the time range was used to calculate the retention rates

5.2 – 2022 SCREENING RESULTS

Table 9 summarizes the outcome indicators for screening exams provided in 2022 by 10-year age groups:

- Of the 254,515 screening mammograms performed, 21,485 (8.4%) had an abnormal result.
- There were 1,440 breast cancers reported in 2022 as of January 31, 2024 (5.7 per 1,000 exams).
- The 2022 overall cancer detection rate decreased slightly compared with 2021, from 5.9 to 5.7 cancers detected per 1000 individuals screened.
- The overall cancer detection rate is highest on first screens for participants who reported a family history (mother, sister, daughter).
- The proportion of cancers detected per 1000 individuals screened increases with age.

Abnormal Call Rate

Abnormal Call Rate is the percentage of individuals who were referred for further testing because of an abnormal screening mammogram result.

- The overall screen abnormal call rate (first and subsequent screens) decreased slightly in 2022 (8.4%) compared to 2021 at 8.7%.
- The abnormal call rate is higher on first screens than on subsequent screens.
- The overall abnormal call rate decreases with age, from 13.1% for ages 40 to 49 to 6.4% for ages 70 to 74.

Cancer Detection Rate

Cancer Detection Rate is the number of individuals with a screen detected cancer per 1,000 individuals who had a screening mammogram. Cancer detection rates may be presented as invasive cancer detection rates, in-situ cancer detection rates and overall cancer detection rates.

- The overall cancer detection rate decreased slightly in 2022 compared to 2021 (from 5.9 per 1000 screens to 5.7 per 1000).
- The cancer detection rate for higher risk individuals was greater than that for average risk individuals for first screens.
- The overall DCIS detection rate remained the same in 2022 compared to 2021 at 1.4 per 1000 individuals screened.

Positive Predictive Value

Positive Predictive Value (PPV) is the percentage of individuals with an abnormal mammogram result who were diagnosed with breast cancer (DCIS or invasive) after completion of diagnostic work-up.

- The overall positive predictive value decreased slightly in 2022 compared to 2021 (from 6.9% to 6.8%).

TABLE 9: BREAST SCREENING PROGRAM OUTCOME INDICATORS BY 10-YEAR AGE GROUPS: 2022

		Age at Exam					
		40-49	50-59	60-69	70-74	75+	All
Number of Exams		45,247	77,762	87,343	33,362	10,222	254,515
on first screens		44.0%	13.2%	6.7%	3.8%	3.9%	15.0%
on higher risk screens		20.6%	23.5%	30.3%	33.8%	39.7%	27.4%
Number of Cancers		137	367	561	242	129	1,440
on first screens		52.6%	27.8%	14.3%	10.7%	9.3%	20.6%
on higher risk screens		24.8%	19.9%	29.8%	33.9%	45.7%	29.0%
Abnormal Call Rate		13.1%	8.5%	6.8%	6.4%	7.8%	8.4%
on first screens	Overall	17.8%	19.5%	17.6%	19.1%	18.6%	18.3%
	Higher Risk	17.5%	21.4%	15.9%	22.0%	23.7%	18.4%
	Average Risk	17.9%	19.3%	17.9%	18.5%	17.0%	18.3%
on subsequent screens	Overall	9.4%	6.8%	6.0%	5.9%	7.4%	6.7%
	Higher Risk	8.7%	6.1%	5.9%	5.4%	6.8%	6.2%
	Average Risk	9.7%	7.1%	6.0%	6.2%	7.7%	6.9%
Overall Cancer Detection Rate (per 1,000)		3.0	4.7	6.4	7.3	12.6	5.7
on first screens	Overall	3.6	10.0	13.7	20.4	29.8	7.8
	Higher Risk	6.0	8.0	15.9	51.9	51.5	11.6
	Average Risk	3.3	10.2	13.3	13.4	22.9	7.2
on subsequent screens	Overall	2.6	3.9	5.9	6.7	11.9	5.3
	Higher Risk	2.9	3.7	6.0	6.3	13.6	5.6
	Average Risk	2.5	4.0	5.9	6.9	10.8	5.2
DCIS Detection Rate (per 1,000)		0.9	1.3	1.5	1.5	2.4	1.4
on first screens	Overall	0.9	2.4	3.1	3.1	0.0	1.7
	Higher Risk	2.2	1.8	4.5	4.3	0.0	2.6
	Average Risk	0.7	2.5	2.8	2.9	0.0	1.6
on subsequent screens	Overall	0.9	1.1	1.4	1.4	2.5	1.3
	Higher Risk	1.3	0.9	1.5	1.3	2.3	1.3
	Average Risk	0.8	1.2	1.3	1.5	2.7	1.3
Positive Predictive Value		2.3%	5.6%	9.6%	11.4%	16.3%	6.8%
on first screens	Overall	2.0%	5.1%	7.9%	10.8%	16.0%	4.3%
	Higher Risk	3.5%	3.8%	10.0%	24.0%	21.7%	6.3%
	Average Risk	1.9%	5.3%	7.5%	7.3%	13.5%	4.0%
on subsequent screens	Overall	2.7%	5.8%	9.9%	11.5%	16.3%	7.9%
	Higher Risk	3.3%	6.2%	10.1%	11.8%	20.0%	9.0%
	Average Risk	2.5%	5.7%	9.8%	11.3%	14.1%	7.5%
Core Biopsy Yield Ratio		17.3%	37.0%	55.6%	57.4%	60.4%	42.0%
on first screens		14.6%	28.3%	43.0%	52.0%	52.2%	26.5%
on subsequent screens		21.9%	42.0%	58.5%	58.1%	61.4%	49.6%
Open Biopsy Yield Ratio		11.9%	14.7%	31.4%	25.0%	0.0%	18.8%
on first screens		4.8%	11.1%	0.0%	0.0%	0.0%	5.7%
on subsequent screens		19.0%	16.0%	36.7%	25.0%	0.0%	23.5%

Notes

1. See glossary in the Appendix for definitions of terms.
2. Overall Cancer Rate includes ductal carcinoma in situ (DCIS).
3. An additional 221 abnormal screens had incomplete or lost to follow-up. Information from these screens is excluded from all entries in the table other than exam counts and abnormal call rates.
4. The final number of cancers is still to be determined.
5. 579 exams were performed for women <40 years old and 4 cancer was detected for this age group.
6. The "All" column includes women less than 40 years of age.
7. Breast Screening Program data extraction date: January 31, 2024.

Diagnostic procedure information is available to date on 21,313 (99%) of the screening mammograms with abnormal findings. Table 10 shows the proportion of participants receiving specific diagnostic procedures as part of the work-up on their screen-detected abnormalities.
Overall, 18% and 5% of participants with abnormal screening mammograms had core biopsy and open biopsy, respectively.

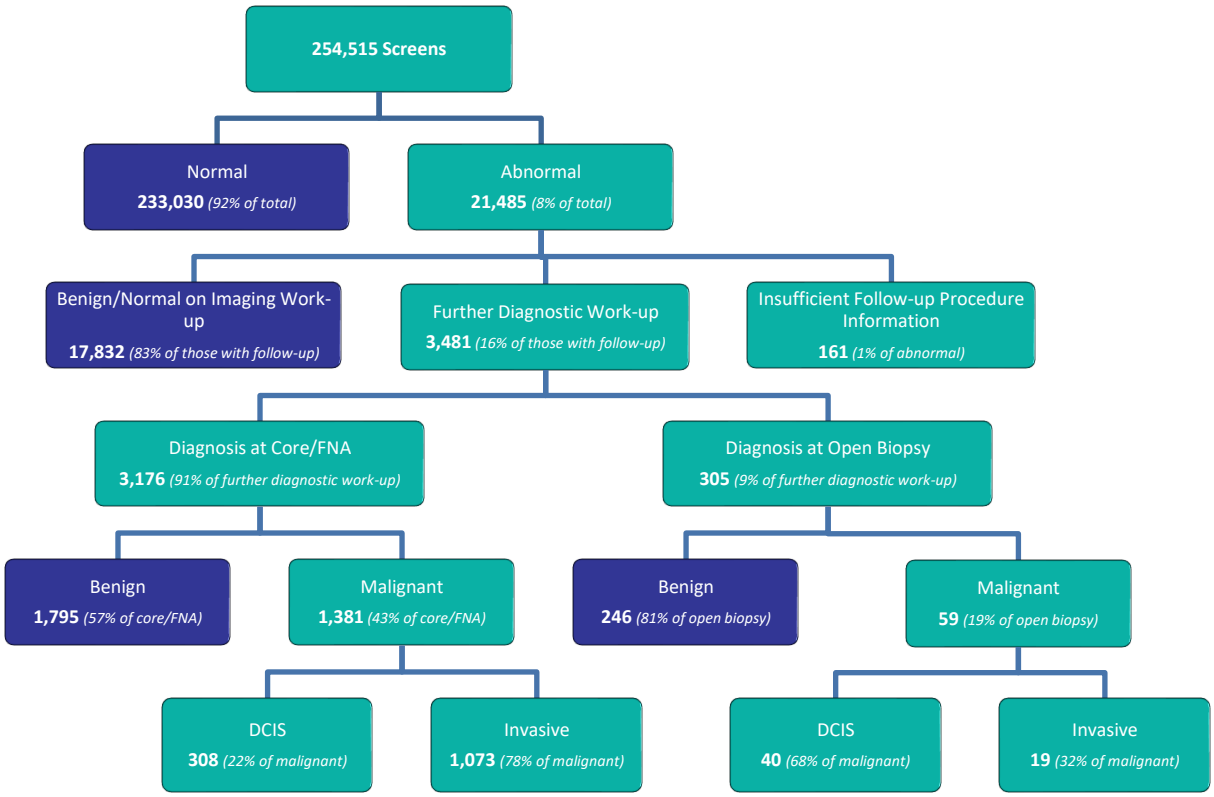
TABLE 10: DIAGNOSTIC PROCEDURES RECEIVED BY BREAST SCREENING PROGRAM PARTICIPANTS WITH "ABNORMAL" SCREENING MAMMOGRAMS: 2022

	Age at Exam						
Procedure	**<40**	**40-49**	**50-59**	**60-69**	**70-79**	**80+**	**All**
Diagnostic Mammogram	96%	94%	95%	95%	95%	90%	**95%**
Ultrasound	79%	76%	73%	71%	70%	71%	**73%**
Fine Needle Aspiration		0%	0%	0%	1%		**< 1%**
Core Biopsy	13%	16%	17%	19%	23%	34%	**18%**
Surgical Biopsy	1%	3%	4%	6%	7%	5%	**5%**
with Localization	1%	3%	4%	6%	7%	4%	**5%**
Number of cases with diagnostic assessment information available	77	5,902	6,564	5,858	2,733	179	**21,313**

Notes

1. Breast Screening Program data extraction date: January 31, 2024
2. The procedures in this table are not mutually exclusive; an individual may have multiple procedures performed

FIGURE 11: SCREENING OUTCOME SUMMARY: 2022



5.3 2022 CANCER DETECTION

Histologic features of breast cancers detected by the Breast Screening Program in 2022 are summarized by 10-year age groups in Table 11. Histologic features of breast cancer cases were obtained from the pathology reviews, if available. Otherwise, they were obtained from the original diagnostic reports. Invasive tumour size was determined from the best available source: (1) pathological, (2) radiological, or (3) clinical.

- Overall, 24% of cancers detected were in situ.
- Of the invasive cancers detected, 59% were ≤15 mm, 77% did not have invasion of the regional lymph nodes, and 44% were grade 3 (i.e. poorly differentiated) tumours, ≤ 15mm.

These overall outcome indicators met the international targets[3] recommended for screening programs.

TABLE 11: HISTOLOGIC FEATURES OF BREAST CANCERS DETECTED BY BREAST SCREENING PROGRAM: 2022

	Age at Exam									
Histological Features	**40-49**		**50-59**		**60-69**		**70-79**		**Age 40-79**	
Number of Cancers	137		368		562		336		1,403	
in situ	42	31%	102	28%	129	23%	65	19%	338	24%
invasive	95	69%	266	72%	433	77%	271	81%	1,065	76%
Invasive Cancers Tumour Size										
≤ 5 mm	9	10%	24	10%	29	7%	15	6%	77	8%
6-10 mm	15	17%	46	19%	112	27%	59	23%	232	23%
11-15 mm	23	26%	68	28%	114	28%	76	29%	281	28%
16-20 mm	8	9%	47	19%	64	15%	48	19%	167	17%
> 20 mm	34	38%	61	25%	95	23%	61	24%	251	25%
unknown size	6		20		19		12		57	
Invasive Cancers with tumour ≤ 15 mm	47	53%	138	56%	255	62%	150	58%	590	59%
Node Involvement in Invasive Cancers										
no	55	65%	177	75%	324	81%	187	78%	743	77%
yes	29	35%	60	25%	76	19%	54	22%	219	23%
no nodes sampled / unknown	11		29		33		30		103	
Histologic Grade of Invasive Cancers										
1 - well differentiated	19	21%	67	27%	131	31%	67	25%	284	28%
2 - moderately differentiated	53	58%	118	47%	217	52%	149	56%	537	53%
3 - poorly differentiated	19	21%	64	26%	68	16%	50	19%	201	20%
unknown grade	4		16		16		5		41	
Grade 3 tumour ≤ 15 mm	8	42%	32	50%	21	31%	26	52%	87	43%

Notes

1. Targets: >50% invasive tumours ≤15mm, >70% with negative nodes, >30% grade 3 tumours ≤15mm.
2. Breast Screening Program data extraction date: January 31, 2024.
3. Tabàr L, Fagerberg G, Duffy SW, Day NE, Gad A, Gröntoft O. Update of the Swedish two-country program of mammographic screening for breast cancer. Radiol Clin North am. 1992 Jan:30(1):187-210

5.4 OUTCOME INDICATORS BY CALENDAR YEAR: 2018 – 2022

Table 12 shows the outcome indicators for screening exams provided over five years.

- Cancer detection and abnormal call rates have been stable for the last five years.
- Sensitivity, specificity and interval cancer rate calculations are currently not available.

Regular record linkage with the British Columbia Cancer Registry enables the Breast Screening Program to determine the number of non-screen detected (interval) cancers occurring in Breast Screening Program participants. Sensitivity (i.e. probability of finding individuals with breast cancer) and specificity (i.e. probability of a negative mammogram in individuals without breast cancer) by calendar year are shown in Table 12. The Breast Screening Program conducts formal reviews, both blinded and retrospective, of ~ 50% of interval cancers in Breast Screening Program participants as a quality assurance process.

Comparison of prevalence rate at first screen with the historical incidence rate prior to the onset of screening practice provides another measure of program performance. The expected age-specific incidence rates in the absence of screening were derived from the 1982 breast cancer incidence data reported for British Columbia. Since screening may be obtained outside of the Breast Screening Program, the definition of prevalent screens has been restricted to those individuals with no previous outside mammogram within 24 months of their first screening encounter.

TABLE 12: BREAST SCREENING PROGRAM OUTCOME INDICATORS BY CALENDAR YEAR BETWEEN 2018 AND 2022 INCLUSIVE

Outcome Indicators	Calendar Year					
	2018	2019	2020	2021	2022	5-Year Cumulative
Number of Exams	260,369	266,405	186,019	261,671	254,515	1,228,979
on first screens	10.1%	10.5%	8.8%	10.8%	15.0%	11.1%
Number of Cancers	1,504	1,574	1,062	1,597	1,440	7,177
on first screens	13.9%	13.1%	12.1%	12.6%	20.6%	14.5%
Abnormal Call Rate	9.2%	8.9%	8.7%	8.7%	8.4%	8.8%
on first screens	20.7%	20.2%	19.7%	19.4%	18.3%	19.6%
on subsequent screens	7.9%	7.5%	7.6%	7.4%	6.7%	7.4%
Overall Cancer Detection Rate (per 1,000)	5.8	5.9	5.7	6.1	5.7	5.8
on first screens	7.9	7.4	7.9	7.2	7.8	7.6
on subsequent screens	5.5	5.7	5.5	6.0	5.3	5.6
DCIS Detection Rate (per 1,000)	1.3	1.1	1.1	1.5	1.4	1.3
on first screens	1.7	1.7	1.4	1.7	1.7	1.7
on subsequent screens	1.2	1.1	1.1	1.5	1.3	1.2
Positive Predictive Value	6.3%	6.7%	6.6%	7.0%	6.8%	6.7%
on first screens	3.9%	3.7%	4.0%	3.7%	4.3%	3.9%
on subsequent screens	7.0%	7.7%	7.3%	8.1%	7.9%	7.6%
Core Biopsy Yield Ratio	39.0%	43.9%	43.5%	43.6%	42.0%	42.3%
on first screens	15.5%	12.9%	22.4%	17.5%	5.7%	15.1%
on subsequent screens	43.7%	51.0%	49.1%	49.2%	49.6%	48.4%
Open Biopsy Yield Ratio	27.4%	30.7%	25.7%	24.2%	18.8%	26.6%
on first screens	15.5%	12.9%	22.4%	17.5%	5.7%	15.1%
on subsequent screens	30.9%	36.3%	26.5%	25.9%	23.5%	30.0%
Interval Cancer Rate (per 1,000 normal screens)						
0-12 months	0.6	0.8	0.8	-	-	-
after first screens	0.8	1.0	1.0	-	-	-
after subsequent screens	0.6	0.8	0.8	-	-	-
13-24 months	0.9	1.0	-	-	-	-
Sensitivity (1 - false negative rate)	91.0%	88.6%	88.1%	-	-	-
Specificity (1 - false positive rate)	91.3%	91.7%	91.9%	-	-	-

Notes

1. See glossary in the Appendix for definitions of terms.
2. Overall Cancer Detection Rate includes ductal carcinoma in situ (DCIS).
3. The final number of cancers in 2022 is still to be determined.
4. Number of cancers and related rates do not include data for individuals whose follow-up is incomplete.
5. Interval Cancer Rate, Sensitivity, and Specificity results are not complete because the data is not available yet.
6. Breast Screening Program data extraction date: January 31, 2024

5.5 – OUTCOME INDICATORS BY 10-YEAR AGE GROUPS: 2018 – 2022 CUMULATIVE

Table 13 shows the outcome indicators for exams provided in a five-year period by 10-year age groups.

- From 2018 to 2022, the Breast Screening Program provided 1,228,979 breast screening examinations, and detected 7,177 breast cancers.
- Approximately 90% of the cancers detected during this five-year period were in individuals 50 years of age or older. The screen-to-cancer ratio ranges from 111:1 for individuals in their 70's to 298:1 for individuals in their 40's.
- Although the risk of breast cancer increases with age, the abnormal call rates were higher in the younger age groups
- The abnormal-to-cancer ratio ranges from 8:1 for individuals in their 70's to 39:1 for individuals in their 40's.
- The cancer detection rate and positive predictive value increases for individuals as they get older.
- Interval Cancer Rate, Sensitivity and Specificity results are not complete because the data is not available yet.

TABLE 13: BREAST SCREENING PROGRAM OUTCOME INDICATORS BY 10-YEAR AGE GROUPS BETWEEN 2018 AND 2022 INCLUSIVE

	Age at Exam					
Outcome Indicators	**40-49**	**50-59**	**60-69**	**70-79**	**80+**	**All**
Number of Exams	212,161	388,995	428,169	189,778	8,053	**1,228,979**
on first screens	35.9%	9.2%	4.4%	2.5%	3.0%	**11.1%**
Number of Cancers	716	1,841	2,764	1,718	131	**7,177**
on first screens	47.2%	17.8%	9.3%	5.9%	7.6%	**14.5%**
Abnormal Call Rate	13.3%	8.7%	7.3%	7.2%	8.8%	**8.8%**
on first screens	19.1%	20.6%	19.2%	20.0%	22.5%	**19.6%**
on subsequent screens	10.0%	7.5%	6.7%	6.9%	8.3%	**7.4%**
Overall Cancer Detection Rate (per 1,00(	3.4	4.7	6.5	9.1	16.3	**5.8**
on first screens	4.4	9.2	13.7	21.4	41.2	**7.6**
on subsequent screens	2.8	4.3	6.1	8.7	15.5	**5.6**
DCIS Detection Rate (per 1,000)	1.0	1.2	1.3	1.6	2.9	**1.3**
on first screens	1.3	2.0	2.1	3.8	8.2	**1.7**
on subsequent screens	0.9	1.1	1.3	1.6	2.7	**1.2**
Positive Predictive Value	2.6%	5.5%	8.9%	12.7%	18.8%	**6.7%**
on first screens	2.3%	4.5%	7.2%	10.8%	18.5%	**3.9%**
on subsequent screens	2.8%	5.7%	9.1%	12.8%	18.8%	**7.6%**
Core Biopsy Yield Ratio	19.4%	36.9%	52.6%	59.6%	67.4%	**42.3%**
on first screens	15.9%	25.7%	40.3%	46.0%	52.9%	**24.4%**
on subsequent screens	24.1%	40.9%	54.4%	60.8%	68.8%	**48.4%**
Open Biopsy Yield Ratio	14.1%	25.4%	31.7%	40.7%	26.7%	**26.6%**
on first screens	14.3%	14.4%	15.2%	28.6%	33.3%	**15.1%**
on subsequent screens	14.0%	28.2%	33.7%	41.5%	25.0%	**30.0%**
Interval Cancer Rate (per 1,000 normal screens)						
0-12 months	0.9	0.7	0.7	1.0	1.0	**0.8**
after first screens	0.8	0.9	1.2	1.1	<0.1	**0.9**
after subsequent screens	0.9	0.7	0.7	1.0	1.1	**0.8**
13-24 months	1.0	0.9	0.8	1.4	2.4	**1.0**
Sensitivity (1 - false negative rate)	82.7%	88.3%	90.8%	90.9%	94.8%	**89.3%**
Specificity (1 - false positive rate)	87.0%	91.6%	93.1%	93.4%	92.6%	**91.6%**

Notes

2. See glossary in the Appendix for definitions of terms.
3. Overall cancer detection rate includes ductal carcinoma in situ (DCIS),
4. Number of cancers and related rates do not include data for women whose follow-up is incomplete.
5. The final number of cancers in 2022 is still to be determined.
6. The total for all ages includes women less than 40 years of age.
7. Interval Cancer Rate, Sensitivity, and Specificity results are not complete because the data is not available yet.
8. Breast Screening Program data extraction date: January 31, 2024

5.6 – OUTCOME INDICATORS BY HSDA: 2018 – 2022 CUMULATIVE

Outcome indicators for 2018 to 2022 are summarized by HSDA in Table 14.

- South Vancouver Island region has the lowest abnormal call rate (6%), Northeast and North Shore / Coast Garibaldi have the highest (11%).
- Northeast has the lowest cancer detection rate (4.3 per 1,000), while Northwest and Fraser East have the highest (6.6 per 1,000).
- Northeast has the lowest positive predictive value (4%) and South Vancouver Island has the highest (10%).
- All of the HSDAs meet the national targets[4] recommended for screening programs for invasive tumour detection size (target > 50%); thirteen out of the twenty two HSDAs meet the national target recommended for percentage of cases with negative nodes (target > 70%).

[4] Report from the Evaluation Indicators Working Group: Guidelines for Monitoring Breast Screening Program Performance third Edition. Health Canada 2013

TABLE 14: BREAST SCREENING PROGRAM OUTCOME INDICATORS BY HEALTH SERVICE DELIVERY AREA (HSDA) BETWEEN 2018 AND 2022 INCLUSIVE

HSDA	% Called Abnormal	Cancer Detection Rate (per 1,000)	PPV	In-Situ : Invasive (number)	% Invasive ≤ 15 mm	% Invasive with -ve nodes
East Kootenay	10%	6.4	7%	24 : 101	54%	80%
Kootenay Boundary	9%	5.6	6%	22 : 77	60%	68%
Okanagan	8%	6.3	8%	135 : 530	63%	72%
Thompson Cariboo Shuswap	10%	5.8	6%	72 : 267	61%	69%
Interior	9%	6.1	7%	253 : 975	61%	72%
Fraser East	10%	6.6	6%	99 : 359	59%	70%
Fraser North	10%	5.8	6%	241 : 734	57%	69%
Fraser South	9%	5.5	6%	252 : 819	58%	72%
Fraser	9%	5.8	6%	592 : 1912	58%	70%
Richmond	9%	5.3	6%	83 : 234	50%	70%
Vancouver	9%	5.5	6%	233 : 662	56%	71%
North Shore / Coast Garibaldi	11%	5.8	5%	104 : 373	62%	76%
Vancouver Coastal	9%	5.6	6%	420 : 1269	57%	72%
South Vancouver Island	6%	5.8	10%	104 : 527	51%	72%
Central Vancouver Island	7%	6.3	9%	107 : 407	60%	80%
North Vancouver Island	8%	6.5	8%	29 : 209	57%	69%
Vancouver Island	7%	6.1	9%	240 : 1143	55%	74%
Northwest	10%	6.6	7%	19 : 87	56%	60%
Northern Interior	10%	6.3	6%	43 : 165	65%	75%
Northeast	11%	4.3	4%	2 : 41	51%	78%
Northern	10%	6.0	6%	64 : 293	61%	71%
Unknown	7%	5.1	7%	3 : 5	80%	60%
British Columbia	**9%**	5.8	7%	1572 : 5597	58%	72%

Notes

1. See glossary in the Appendix for definitions of terms.
2. Targets: >50% invasive tumours ≤15mm, >70% with negative nodes.
3. Breast Screening Program data extraction date: January 31, 2024

5.7 – CANCER CHARACTERISTICS BY AGE: CUMULATIVE UP TO AND INCLUDING 2022

From the start of the program in July 1988 to December 2022, 33,912 participants were found to have breast cancer through screening-initiated work-up. Histologic features of breast cancers detected by the Breast Screening Program, cumulative up to and including 2022, are summarized by 10-year age groups in Table 15. Internationally recommended targets have been achieved.

Overall, invasive cancers found in participants ages 40 to 49 tend to be larger and more likely to have node involvement than cancers found in older participants.

TABLE 15: HISTOLOGIC FEATURES OF BREAST CANCERS DETECTED BY BREAST SCREENING PROGRAM CUMULATIVE UP TO AND INCLUDING 2022

	Age at Exam											
Histological Features	**40-49**		**50-59**		**60-69**		**70-79**		**80+**		**Age 40+**	
Number of Cancers	4,797		9,366		11,645		7,556		548		**33,912**	
in situ	1,487	31%	2,301	25%	2,366	20%	1,326	18%	72	13%	**7,552**	**22%**
invasive	3,310	69%	7,065	75%	9,279	80%	6,230	82%	476	87%	**26,360**	**78%**
Invasive Cancers Tumour Size												
≤ 5 mm	324	10%	651	9%	833	9%	460	7%	37	8%	**2,305**	**9%**
6-10 mm	606	19%	1,528	22%	2,441	27%	1,789	29%	121	26%	**6,485**	**25%**
11-15 mm	844	26%	1,941	28%	2,638	29%	1,806	29%	127	27%	**7,356**	**28%**
16-20 mm	501	16%	1,157	17%	1,395	15%	922	15%	83	18%	**4,058**	**16%**
> 20 mm	943	29%	1,645	24%	1,833	20%	1,171	19%	102	22%	**5,694**	**22%**
unknown size	(92)		(143)		(139)		(82)		(6)		**(462)**	
Invasive Cancers with tumour size ≤ 15 mm	1,774	55%	4,120	60%	5,912	65%	4,055	66%	285	61%	**16,146**	**62%**
Node Involvement in Invasive Cancers												
no	2,042	69%	4,782	73%	6,731	78%	4,518	81%	283	80%	**18,356**	**76%**
yes	919	31%	1,729	27%	1,875	22%	1,066	19%	69	20%	**5,658**	**24%**
no nodes sampled / unkno	(346)		(550)		(670)		(643)		(124)		**(2,333)**	
Histologic Grade of Invasive Cancers												
1 - well differentiated	763	25%	1,996	30%	2,867	33%	2,043	35%	166	37%	**7,835**	**32%**
2 - moderately differentiate	1,383	45%	2,849	43%	4,062	46%	2,750	47%	197	44%	**11,241**	**46%**
3 - poorly differentiated	898	30%	1,728	26%	1,813	21%	1,062	18%	80	18%	**5,581**	**23%**
unknown grade	(263)		(487)		(531)		(371)		(33)		**(1,685)**	
Grade 3 tumour ≤ 15 mm	362	40%	758	44%	866	48%	498	47%	31	39%	**2,515**	**45%**

Notes

1. Targets1: >50% invasive tumours ≤15mm, >70% with negative nodes, >30% grade 3 tumours ≤15mm.
2. Breast Screening Program data extraction date: January 31, 2024.

5.8 – COMPARISON WITH CANADIAN STANDARDS

The Canadian Breast Cancer Screening Initiative (CBCSI) was launched in 1992. Under this initiative, Health Canada (now Public Health Agency of Canada) facilitated a federal/provincial/territorial network that enabled collaboration in the implementation and evaluation of breast cancer screening programs in Canada. In 2012 the CBCSI component transferred to the Canadian Partnership Against Cancer (CPAC).

The Canadian Breast Cancer Screening Database (CBCSD) was first established in 1993. All provincial and territorial programs in Canada contribute data to the CBCSD. The first evaluation report on Organized Breast Cancer Screening Programs in Canada was published in 1999, and prompted the creation of the Evaluation Indicators Working Group to begin the task of defining performance measures for Canadian breast cancer screening programs. Biennial evaluation reports are now produced regularly from the CBCSD by CPAC.

In this section, the Breast Screening Program performance measures are presented against the targets set for Canadian breast cancer screening programs[5]. This document defined a set of performance measures that were developed on the basis of recognized population screening principles, evidence from randomized controlled trials, demonstration projects, and observational studies.

The Breast Screening Program achieves national targets in invasive cancer detection rates, positive predictive values, invasive tumour sizes, and node negative rates. Improvements are needed to: increase participation and retention rates; and reduce abnormal call rates, diagnostic intervals, and benign to malignant open biopsy ratio.

- There was a decrease in the first screen abnormal call rate compared to 2021 (18.8% compared with 20.2% in 2021).
- There was a slight increase in the first screen retention rate (33.7% compared with 31.1% in 2021).

Comparison of Breast Screening Program Performance with Canadian Breast Screening Standards for Ages 50 to 69 is summarized in Table 16.

5 Report from the Evaluation Indicators Working Group: Guidelines for Monitoring Breast Screening Program Performance third Edition. Health Canada 2013

TABLE 16: COMPARISON OF BREAST SCREENING PROGRAM PERFORMANCE WITH CANADIAN BREAST SCREENING STANDARDS FOR INDIVIDUALS AGES 50-69 YEARS

Performance Measure	National Target	Breast Screening Program
Participation Rate (1)	≥ 70% of the eligible population	47.0% + 11.4% MSP
Retention Rate (2)		
Initial Re-screen	≥ 75% initial re-screen within 30 months	33.7%
Subsequent Re-screen	≥ 90% subsequent re-screen within 30 months	64.2%
Abnormal Call Rate (3)		
First Screens	< 10% first screens	18.8%
Subsequent Screens	< 5% re-screens	6.4%
Invasive Cancer Detection Rate (3)		
First Screens	> 5.0 per 1,000 first screens	8.6 per 1,000
Subsequent Screens	> 3.0 per 1,000 re-screens	3.7 per 1,000
DCIS Detection Rate (3)		
First Screens	Surveillance and monitoring only	2.7 per 1,000
Subsequent Screens	Surveillance and monitoring only	1.3 per 1,000
Diagnostic Interval (3)		
no tissue biopsy performed	90% within 5 weeks if no tissue biopsy performe	80.3%
tissue biopsy performed	≥ 90% within 7 weeks if tissue biopsy performed	54.6%
Positive Predictive Value (3)		
First Screens	≥ 5% first screens	6.1%
Subsequent Screens	≥ 6% re-screens	7.9%
Benign Core Biopsy Rate (3)		
First Screens	Surveillance and monitoring only	21.8 per 1,000
Subsequent Screens	Surveillance and monitoring only	4.5 per 1,000
Benign to Malignant Core Biopsy Ratio (3)		
First Screens	Surveillance and monitoring only	2.0 : 1
Subsequent Screens	Surveillance and monitoring only	0.9 : 1
Benign Open Biopsy Rate (3)		
First Screens	Surveillance and monitoring only	0.8 per 1,000
Subsequent Screens	Surveillance and monitoring only	0.3 per 1,000
Benign to Malignant Open Biopsy Ratio (3)		
First Screens	≤ 1 : 1	13.0 : 1
Subsequent Screens	≤ 1 : 1	2.7 : 1
Invasive Cancers Tumour Size ≤ 10 mm (3)	> 25%	30.2%
Invasive Cancers Tumour Size ≤ 15 mm (3)	> 50%	56.2%
Node Negative Rate in Cases of Invasive Cancer (3)	> 70%	71.7%

Notes

1. Screen years: (1) = July 1, 2020 - December 31, 2022, (2) = 2019 - 2021, (3) = 2022.
2. Population data source: P.E.O.P.L.E. 2022 population projection (Oct 2022), BC Stats, Ministry of Technology, Innovation and Citizens' Services, Government of the Province of British Columbia.
3. Breast Screening Program data extraction date: January 31, 2024

5.9 – COST ANALYSIS

The BC Cancer Breast Screening Program is funded by the provincial Ministry of Health through the Provincial Health Services Authority (PHSA). The Breast Screening Program contracts with regional health authorities and private community imaging clinics to provide screening mammography services, including mobile services, throughout the province.

Overall program administration and coordination is provided by the Breast Screening Program Central Office, including: promotion, a provincial toll-free call centre, mobile service coordination and staff travel, result mail-out to participants and physicians, invitation and recall reminder system, follow-up tracking, quality management, program evaluation, and research support.

Costing analysis by fiscal year is summarized in Table 17.

Financial reports for PHSA and BCCA are available at the PHSA website: www.phsa.ca/AboutPHSA/PHSA_Budget_Financials/default.htm

TABLE 17: COST COMPARISON BY FISCAL YEAR

Indicator	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
Total Cost	**$21,452,284**	**$21,242,674**	**$18,812,835**	**$21,748,666**	**$22,382,828**
Total Cost per Screen	$81.76	$82.40	$95.39	$83.39	$88.28
Central Services	$16.80	$17.18	$24.79	$20.99	$17.18
Screen Provision Costs	$49.90	$50.08	$55.38	$47.10	$55.34
Professional Reading Fees	$15.06	$15.14	$15.22	$15.30	$15.76
Cost per Cancer Detected	**$14,683.29**	**$17,702.23**	**$11,914.40**	**$14,159.29**	**$15,908.19**

Notes

1. Program Expenses are audited through PHSA Finance annually.
2. Screen Provision Costs includes, but are not limited to, staffing costs, equipment related costs, and mobile operation costs.
3. The professional reading fee was $15.76 per screen effective April 1, 2022.
4. Cost per cancer detected is based upon screens with complete follow-up. 2020-2021 includes 10 week closure due to COVID
5. The cost per screen is exclusive of salary and benefit increases to public screening centers which, commencing in fiscal 2006, have gone directly to the Health Authority.
6. Breast Screening Program data extraction date: January 31, 2024

APPENDIX 1 – CANCER SCREENING PROGRAM OVERVIEW

Definition of Screening

Screening is one part of a prevention strategy, with the goal of identifying cancer before symptoms or signs develop. Primary cancer prevention strategy involves changes of behaviour or habits that reduce a risk, for example, stopping smoking, fat reduction in the diet, etc. Screening for cancer is a secondary prevention strategy. Secondary cancer prevention strategy targets disease in process[6]. A secondary prevention can reduce cancer morbidity and mortality by: diagnosing invasive disease at an earlier, more favourable prognostic stage; and, detecting precursor lesions associated with some cancers that once eliminated, prevent progression to invasive disease. Screening is "the application of various tests to apparently healthy individuals to sort out those who probably have risk factors or are in the early stages of specified conditions."[7]

Limitations of Screening

The decision to screen an at-risk population for pre-clinical signs of cancer is based on well-established criteria related to cancer and the screening tests that we may use to identify individuals who may have occult disease.[8],[9],[10]

The overall objective of a screening program is to reduce morbidity and mortality from cancer. The goal of screening is to "apply a relatively simple, inexpensive test to a large number of persons in order to classify them as likely or unlikely to have the cancer". The emphasis on likelihood underscores the limits of what should be expected from screening (i.e., screening tests are not diagnostic tests).

A person with an abnormal screening test does not have a definitive diagnosis until additional, more sophisticated diagnostic tests are completed. The emphasis on likelihood also is important because screening tests are inherently limited in their accuracy, which varies by test, cancer site, and individual characteristics. Although most of screening interpretations are accurate, it is inevitable that some individuals are identified as possibly having cancer when they do not (false-positive screen), and screening tests may fail to identify some individuals who do have the disease (false-negative screen).

The comparative evaluation of accuracy versus misinterpretation cannot be considered in absolute terms, but rather should be evaluated in terms of the relative consequences of one or the other kind of error.

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6 US Preventive Services Task Force: Guide to Clinical Preventive Services, Ed 2. Baltimore, Williams & Wilkins, 1996

7 Morrison A: Screening in Chronic Disease. New York, Oxford Press, 1992

8 Cole P, Morrison AS: Basic issues in cancer screening. In Miller AB (ed); Screening in Cancer. Geneva, International Union Against Cancer, 1978, P7

9 Miller AB; Fundamentals of Screening. In Screening for Cancer. Orlando, Academic Press, 1985, P3

10 Wilson JMG, Junger G; Principles and Practice of Screening for Disease. Geneva, World Health Organization, 196

Organized Population Screening Program

To reduce morbidity and mortality from cancer in a population by screening, there must be coordinated and effective strategies to ensure acceptance and utilization of the established screening test. Since screening is targeted at asymptomatic individuals, the fine balance between maximizing benefits and minimizing undesirable effects must be maintained.

An organized approach to screening ensures that the target population has access to the screening service and that it accepts and uses the services offered. This is achieved by including the following six program components:

1. Health Promotion
2. Professional Development/Education
3. Recruitment & Retention
4. Screening Test & Reporting
5. Follow-up

APPENDIX 2 – 2022 BREAST SCREENING PROGRAM SCREENING SERVICES

In 2022 the Program provided screening mammography to individuals ages 40 and over. The recall frequency shown below was used to calculate the program results for the period of January 1, 2022 – December 31, 2022.

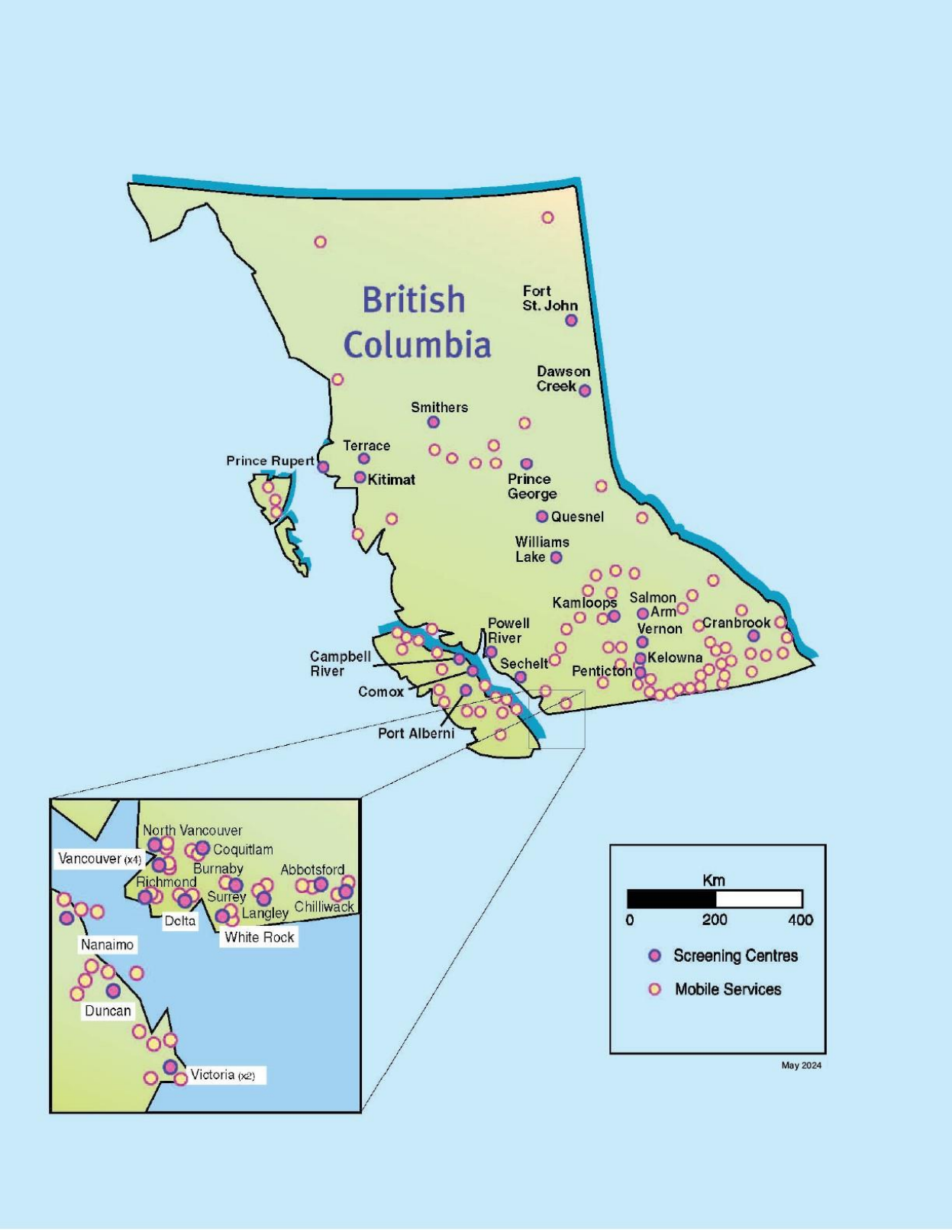
Age	Recall Frequency
<40	Will accept with primary health care provider referral, no recall provided
40-74 Average risk	Reminders for 24-month and 36-month anniversary to age 74.
40-74 Higher Risk	Reminders* for 12-month and 24-month anniversary to age 74
75+	Will accept, no recall provided

Eligibility Criteria:

- Have no breast changes*.
- Have not had a mammogram within 12 months.
- Have not had breast cancer.
- Do not have breast implants.
- Are not pregnant or breast feeding.
- Can provide the name of a primary care provider to receive the results.

* *If there is a new lump, thickening or discharge, we recommend seeing a doctor immediately, even if the last mammogram was normal.*

APPENDIX 3 – MAP OF SCREENING CENTRES



APPENDIX 4 – SCREENING CENTRES CONTACT INFORMATION

Abbotsford	604-851-4750
Burnaby	604-436-0691
Campbell River	250-286-7100 x67477
Chilliwack	604-795-4122
Comox	250-331-5949
Coquitlam	604-927-2130
Cranbrook	250-417-3585
Dawson Creek	250-784-7320
Delta	604-946-1121 x783511
Duncan	250-737-2030 x44027
Fort St John	250-261-7424
Kamloops	250-828-4916
Kelowna	250-861-7560
Langley	604-514-6044
Nanaimo	250-716-5904
IK and NLM Mobile	604-877-6232
North Vancouver	604-903-3860
Penticton	250-770-7573
Port Alberni	250-724-8811
Powell River	604-485-3282
Prince George	250-645-6654
Prince Rupert	250-622-6172
Quesnel	250-985-5680
Richmond	604-244-5505
Salmon Arm	250-833-3607 x6
Sechelt	604-885-2224 x4213
Smithers	250-847-6214
Surrey – JPOCSC	604-582-4592
Terrace	250-638-4046
Vernon	250-549-5451
White Rock	604-535-4512 x757479
Williams Lake	250-302-3220 x4
Vancouver	
BC Women's Health Centre	604-775-0022
Mount St Joseph Hospital	604-877-8388
5752 Victoria Drive	604-321-6770
#505 – 750 West Broadway	604-879-8700
Victoria	
Victoria General Hospital	250-727-4338
305-1990 Fort St	250-952-4232

Mobile Screening Service Delivery Areas

Mobile Screening Communities:			
100 Mile House	Grandforks	Old Massett	Sparwood
Agassiz	Hope	Oliver	Squamish
Armstrong	Houston	Osoyoos	Stewart
Ashcroft	Hudson's Hope	Parksville	Summerland
Barriere	Invermere	Pemberton	Trail
Bella Bella	Kamloops	Pender Island	Tumbler Ridge
Bella Coola	Kelowna	Penticton	Ucluelet
Bowen Island	Kimberley	Pitt Meadows	Valemount
Burns Lake	Kitimat	Port Alberni	Vanderhoof
Castlegar	Ladysmith	Port Alice	Vernon
Chemainus	Lake Cowichan	Port Clements	Westbank
Chetwynd	Lillooet	Port Hardy	Whistler
Clearwater	Lumby	Port McNeil	Winifield
Clinton	Mackenzie	Princeton	
Creston	Maple Ridge	Qualicum Beach	
Dease Lake	Massett	Queen Charlotte	
Elkford	McBride	Radium	
Fernie	Merritt	Revelstoke	
Fort Nelson	Mill Bay	Saanichton	
Fort St. James	Mission	Salmon Arm	
Fraser Lake	Mount Currie	Salt Spring Island	
Gabriola Island	Nakusp	Sayward	
Galiano	Nelson	Skidegate	
Gold River	New Hazelton	Sointula	
Golden	New Westminster	Sooke	

Lower Mainland locations change from time to time. Latest visits include: Agassiz, Hope, Maple Ridge, Mission, New Westminster, Pitt Meadows

First Nations Communities

Community	Area
Alexis Creek (Anaham)	Alexis Creek
Anahim Lake	Anahim Lake
Burns Lake-Southside	Southside
Canim Lake Band	Canim Lake
Fountain	Lillooet
Fort Nelson First Nation	Fort Nelson
Gingolx	Kincolith
Gitlaxt'aamiks (New Aiyansh)	New Aiyansh
Gitwinksihlk	Gitwinksihlk
Haisla First Nation	Kitimat
Kispox	Hazelton
Laxgatls'ap (Greenvile)	Greenville
Lower Kootenay Band	Creston
Lower Nicola	Merritt
McLeod Lake	McLeod Lake
Musqueam Indian Band	Vancouver
Nak'Azdli	Fort St. James
Okanagan Indian Band	Vernon
Qwemtsin	Kamloops
Saik'uz	Vanderhoof
Saulteau First Nation	Chetwynd
Seabird	Agassiz
Simpcw First Nation	Barriere
Skeetchestn	Savona
Spences Bridge	Spences Bridge
Splatsin	Enderby
Stellat'En	Fraser Lake
Sto:lo Nation	Chilliwack
Stone-Yunesit'in	Hanceville
Sts'ailes	Agassiz
Tachie-Tl'azt'en Nation	Fort St. James
Tatla Lake	Tatla Lake
Tiget-T'It'Q'Et First Nation	Lillooet
Tobacco Plains	Grasmere
Toosey-Tl'Esqox	Riske Creek
Tsleil-Waututh	North Vancouver
Upper Nicola	Merritt
Urban Native Health Clinic	Kamloops
Westbank First Nation	Westbank
Witset-Moricetown	Moricetown
Penelakut	Chemainus
Songhees	Victoria
Stz'uminus	Ladysmith

APPENDIX 5 – EDUCATIONAL MATERIALS ORDER FORM

The online materials order form can be found online at http://www.bccancer.bc.ca/screening/breast.

BC CANCER
Provincial Health Services Authority

Order BC Cancer Screening Program Support Materials

Please order program support materials for the BC Cancer Breast, Colon and Cervix Screening programs using the form below. Limits may apply for certain items. Please allow two weeks for delivery. Note that to complete an online order, you must have an email address. To order materials via fax, please complete this form.

Breast Screening

Please specify quantities of each:

	English:	Punjabi	Simplified Chinese	Traditional Chinese
Brochure – "Answering Your Questions About Screening Mammography" (Preview)	Select:	Select:	Select:	Select:
Brochure – "Answering Your Questions About Breast Density Score" (Preview)	Select:	Select:	Select:	Select:

	Quantity:
Poster – "What Happens During Your Screening Mammogram" (Preview) (19 in x 25 in)	
Poster – "What Happens After Your Screening Mammogram" (Preview) (19 in x 25 in)	
Poster – "Why Mammograms Work" (Preview) (8.5 in x 11 in)	
Poster – "Just Ask: When Will I Receive My Results" (Preview) (8.5 in x 11 in)	
Poster – "Just Ask: Why Is Compression Needed" (Preview) (8.5 in x 11 in)	
Poster – "Just Ask: What Happens During A Mammogram" (Preview) (8.5 in x 11 in)	
Booklet – "Just Ask: Conversation Guide For First Time Clients" (Preview)	

	English
Breast Screening Tear-Off Referral Pad (50 sheets per pad) (Preview)	Select:

	English
Wallet Sized Reminder Card (250 cards per box) (Preview)	Select:

Colon Screening

Please specify quantities of each:

	English	Punjabi	Simplified Chinese	Traditional Chinese
Brochure – "Answering Your Questions About Colon Cancer Screening" (Preview)	Select:	Select:	Select:	Select:
Brochure – "Answering Your Questions About Colonoscopy" (Preview)	Select:	Select:	Select:	Select:
Brochure – "Abnormal FIT" (Preview)	Select:	Select:	Select:	Select:
Brochure – "Preparing For Your Colonoscopy" (Preview)	Select:	Select:	Select:	Select:

If material comes in a pack, specify quantities of packs:

	Quantity:
Colonoscopy Reporting Form – Page 1 (100 per pack) (Preview)	
Colonoscopy Reporting Form – Page 2 (25 per pack) (Preview)	
Colonoscopist Reference Sheet (Preview)	
Patient Assessment Process (Preview)	
Specimen Table Example (Preview)	

Cervix Screening

Please specify quantities of each:

	English	Punjabi	Simplified Chinese	Traditional Chinese
Brochure – "Answering Your Questions About Colposcopy" (Preview)	Select:	Select:	Select:	Select:
Brochure – "Answering Your Questions About LEEP" (Preview)	Select:	Select:	Select:	Select:

If material comes in a pack, specify quantities of packs:

	Quantity:
Colposcopy Form – Single Sheet Pad (25 per pack) (Preview)	
Colposcopy Form – Triplicate (100 per pack) (Preview)	
Treatment Form – Single Sheet Pad (25 per pack) (Preview)	
Treatment Form – Triplicate (25 per pack) (Preview)	

APPENDIX 6 – GLOSSARY

Abnormal Call Rate: Proportion of screening mammography examinations determined to require further diagnostic assessment (i.e. called "abnormal").

$$\text{Abnormal Call Rate} = \frac{\text{Number of exams called abnormal}}{\text{Total number of exams}} \times 100\%$$

Benign Core Biopsy Rate: Proportion of cases with complete follow-up that resulted in a benign core biopsy for diagnostic purposes, where each core biopsy represents a case.

Benign Open Biopsy Rate: Proportion of cases with complete follow-up that resulted in a benign open biopsy for diagnostic purposes, where each open biopsy represents a case.

Benign to Malignant Core Biopsy Ratio:

$$\text{Benign to Malignant Core Biopsy Ratio} = \frac{B_b}{M_b} : 1$$

- B_b Number of benign cases detected by core biopsy, where each core biopsy performed represents a case.
- M_b Number of malignant cancers cases detected by core biopsy, where each core biopsy represents a case.

Benign to Malignant Open Biopsy Ratio:

$$\text{Benign to Malignant Open Biopsy Ratio} = \frac{B_b}{M_b} : 1$$

- B_b Number of benign cases detected by core biopsy, where each open biopsy performed represents a case.
- M_b Number of malignant cancers cases detected by core biopsy, where each open biopsy represents a case.

Core Biopsy Yield Ratio: Proportion of cases with core biopsy that resulted in a diagnosis of breast cancer, where each core biopsy performed represents a case.

$$\text{Core Biopsy Yield Ratio} = \frac{M_b}{B_b + M_b} \times 100\%$$

- B_b Number of diagnostic core biopsies without breast cancer diagnosis.
- M_b Number of diagnostic core biopsies with breast cancer diagnosis.

DCIS (or In Situ Cancer) Detection Rate: Number of ductal carcinoma in situ (DCIS) cases detected per 1,000 screens with complete follow-up.

Diagnostic Interval: Percentage of individuals with an abnormal screening mammogram result who were diagnosed (benign or cancer) within the recommended time interval from the abnormal screen date.

- ≤ 5 weeks without a tissue biopsy
- ≤ 7 weeks with a tissue biopsy

Invasive Cancer Detection Rate: Number of invasive cancer cases detected per 1,000 screens with complete follow-up.

Interval Cancer Rate: Number of individuals being diagnosed with post-screen breast cancer at a breast location which was called normal at previous screen within the specified period of time per 1,000 screens.

Node Negative Rate in Cases of Invasive Cancer: Proportion of invasive cancers in which the cancer has not invaded the lymph nodes.

Open Biopsy Yield Ratio: Proportion of cases with open biopsy that resulted in a diagnosis of breast cancer, where each open biopsy performed represents a case.

$$\text{Open Biopsy Yield Ratio} = \frac{M_b}{B_b + M_b} \times 100\%$$

B_b Number of diagnostic open biopsies without breast cancer diagnosis.

M_b Number of diagnostic open biopsies with breast cancer diagnosis.

Overall Cancer Detection Rate: Number of cancer cases detected per 1,000 screens with complete follow-up.

Participation Rate: The percentage of individuals who have a screening mammogram within 30 months as a proportion of the prevalence adjusted population.

Positive Predictive Value (PPV) of Screening Mammography: Proportion of “abnormal” cases found to have breast cancer after diagnostic workup.

$$\text{PPV} = \frac{\text{Number of screen-detected cancers}}{\text{Number of "abnormal" cases with complete follow-up}}$$

Prevalence to Expected Incidence Ratio: Comparison between incidence rates at first (prevalent) screen with historical incidence rate prior to onset of screening practice. Prevalent screens have been restricted to those individuals with no previous outside mammogram within 24 months of their first program screens. The 1982 incidence rates by five-year age group obtained from the BC Cancer Registry were chosen as the comparison reference.

$$\text{P : I Ratio} = \frac{\sum_i Ca_i}{\sum_i N_i R_i}$$

Where Ni is the number of prevalent screens for age group i, Cai is the number of cancers detected in prevalent screens for age group i and Ri is the expected incidence rate for age group i. Prevalence to expected incidence ratio for ages 50 to 79 would be calculated by summing over age groups 50 to 54,

55 to 59, 60 to 64, 65 to 69, 70 to 74, and 75 to 79 in the numerator and denominator.

Retention Rate (Return Rate): The estimated percentage of individuals without history of breast cancer diagnosis returned for rescreen within a certain period of time from their previous screen. This rate is estimated using Fine & Grey competing risk survival analysis method.

Sensitivity: Probability of interpreting screening mammograms of breast cancer cases as "abnormal". It measures how well screening mammography determines the presence of breast cancer.

$$\text{Sensitivity} = \frac{TP}{TP + FN}$$

TP Number of screen-detected breast cancer cases.

FN Number of breast cancer cases called "normal" and diagnosed within 12 months post screen.

SMP: Breast Screening Program

Specificity: Probability of interpreting screening mammograms of cases with no evidence of breast cancer as "normal". It measures how well screening mammography determines the absence of breast cancer.

$$\text{Specificity} = \frac{TN}{TN + FP}$$

TN Number of cases with "normal" screening mammograms that remained without evidence of breast cancer before the next screening visit, or within 12 months after the last screening visit.

FP Number of cases with no evidence of breast cancer but whose screening mammograms were called "abnormal".

APPENDIX 7 – ACKNOWLEDGEMENTS

The Breast Screening Program would like to thank its partners who have supported and contributed to the Program over the years. The success of the Program depends on an integrated system of:

- Community health professionals promoting the benefits of screening.
- Dedicated and highly trained staff to perform and interpret the screening mammograms.
- Primary care providers and medical specialists to provide diagnostic follow-up and treatment.
- Community facilities providing space and personnel to support mammography.

We would like to thank the following organizations for their ongoing support (alphabetical):

BC Cancer Foundation
BC Radiological Society
Canadian Cancer Society
Canadian Partnership Against Cancer
College of Physicians and Surgeons of BC
Doctors of BC
Divisions of Family Practice
Society of General Practitioners
University of British Columbia

APPENDIX 8 – COMMITTEES (effective March 2024)

Alphabetical Listing – By Surname

Quality Management Committee (QMC)	Quality Management Support Group
Ms. Rachel Berns	Ms. Amanda Hunter
Dr. Cathy Clelland	Ms. Shelley Pietraroia
Dr. Stephen Chia	Ms. Sheila MacMahon
Dr. Zuzana Kos	Ms. Moira Pearson
Dr. Fabio Feldman	Dr. Rasika Rajapakshe
Ms. Amanda Hunter	Dr. Derek Wells
Mr. Javis Lui	
Ms. Sheila MacMahon	
Ms. Rableen Nagra	
Ms. Mary Nagy	
Dr. Linda Warren	
Dr. Charlotte Yong-Hing – Chair	

Screener's Advisory Committee (SAC)	
Dr. Eleanor Clark	Dr. Peter McNicholas
Dr. Marie-Josee Cloutier	Ms. Rableen Nagra
Dr. Jennifer Dolden	Ms. Mary Nagy
Dr. Brenda Farnquist	Dr. David O'Keeffe
Dr. Fabio Feldman	Dr. Amie Padilla-Thornton
Dr. Dellano Fernandes	Dr. Catherine Phillips
Ms. Amanda Hunter	Dr. Rasika Rajapakshe
Dr. Kevin Irish	Dr. Karen Seland
Dr. Dennis Janzen	Dr. Stuart Silver
Dr. Rob Johnson	Dr. Phil Switzer
Dr. Tahir Khalid	Dr. Beth Tanton
Dr. John Lai	Dr. Claire Thugur
Dr. Grant Larsen	Dr. Linda Warren
Dr. Brent Lee	Dr. Peggy Yen
Dr. Colin Mar	Dr. Charlotte Yong-Hing– Chair
Dr. Darryn Maisonneuve	

APPENDIX 9 – RADIOLOGISTS SCREENERS (effective March 2024)

*Alphabetical listing, *** Indicates Chief Screener***

Abbotsford & Chilliwack	**Kelowna**	Dr. Dennis Janzen*
Dr. Amarjit Bajwa	Dr. Brenda Farnquist*	Dr. Dennis Lee
Dr. Joseph Chooi	Dr. Trent Orton	Dr. Amir Neyestani
Dr. Tahir Khalid*	Dr. Michael Partrick	**Vancouver BC Women's Health Centre**
Dr. Chung Ko	Dr. Cathy Staples	Dr. Marie-Josee Cloutier*
Burnaby & Richmond	**Langley**	Dr. Rashin Rastegar
Dr. Theodore Blake	Dr. Joseph Chooi	**Vancouver – Mount St. Joseph Hospital**
Dr. Andy Chan	Dr. Tahir Khalid	Dr. Roberta Dionello
Dr. Tracey Chandler	Dr. Chung Ko	Dr. Jessica Farrell
Dr. Bill Collins	Dr. John Lai*	Dr. Amie Padilla-Thornton*
Dr. Vanindar (Vee) Lail	Dr. Jerome Wong	**Vancouver – Victoria Drive**
Dr. Kelly MacLean	Dr. Xing Wong	Dr. Jennifer Jessup
Dr. Beth Tanton*	**Nanaimo/Islands & Coastal Mobile**	Dr. Connie Siu
Dr. Betty Tuong	Dr. David Coupland	Dr. Phil Switzer*
Comox	Dr. Robert Johnson*	**Vancouver – #505 – 750 West Broadway**
Dr. Grant Larson*	Dr. Zenobia Kotwall	Dr. Nicola Lapinsky
Dr. Jennifer Waterhouse	Dr. David O'Keefe	Dr. Nicholas Murray
Dr. Peggy Yen	Dr. Paul Trepanier	Dr. Linda Warren*
Coquitlam	Dr. Peggy Yen* (Mobile Chief Screener)	Dr. Charlotte Yong-Hing
Dr. Vishal Anand	**North Vancouver & Sechelt**	**Vernon / Salmon Arm**
Dr. Debra Chang	Dr. Sven Aippersbach	Dr. Glenn Scheske
Dr. Rita Chiu	Dr. Simon Bicknell	Dr. Claire Thurgur*
Dr. Jennifer Dolden*	Dr. Bobbi-Jo Coldwell*	Dr. Adam Weathermon
Dr. Jian Li	Dr. Patrick Llewellyn	Dr. Chad Wherry
Dr. Anita McEachern	Dr. Catherine Phillips	**Victoria General Hospital / Victoria Ft. St.**
Dr. Robert van Wiltenburg	Dr. David Spouge	Dr. Richard Eddy
Cranbrook	**Penticton**	Dr. Nicola Finn
Dr. Daryn Maisonneuve*	Dr. Peter McNicholas*	Dr. Chris King
Interior / Northern &	Dr. Meghan Van Vliet	Dr. Jonathan Hickle
Lower Mainland Mobile	**Prince George (UHNBC)**	Dr. Brent Lee*
Dr. Kevin Ibach	Dr. Shyr Chui	Dr. Stuart Silver*
Dr. Colin Mar	Dr. Sarah Harvie	Dr. Frederick Smither
Dr. Tetyana Martin	Dr. Gurpreet Narang	Dr. Paul Sobkin
Dr. Charlotte Yong-Hing*	Dr. Karen Seland*	**White Rock & Delta**
Kamloops	**Surrey – JPOC**	Dr. Eleanor Clark*
Dr. Dellano Fernandes*	Dr. Sanjiv (Sonny) Bhalla	Dr. Jeff Hagel
Dr. Vipal Vedd	Dr. Guy Eriksen	Dr. Tarek Helou

APPENDIX 10 – PUBLICATIONS AND PRESENTATIONS

Publications

Colin Mar

Presentations, Interviews and Lectures, Research Grants

Colin Mar

Program Update - Policy, Practice and Performance Review. Breast Screening Forum, Richmond, BC. April 2, 2022

Janette Sam

Program Update - Policy, Practice and Performance Review. Breast Screening Forum, Richmond, BC. April 2, 2022

Sam, Janette – presenter; Rajapakshe R, Sam J, Mar C, Liang P, Graham-Knight J, Wright Q, Shen H, Park H, Park E, Kim K. Detailed External Validation of A Commercial AI Algorithm for Breast Cancer Detection in The Setting of An Organized Population-based Breast Screening Program [Abstract] 2022 RSNA; Nov 27 – Dec 1, 2022, Chicago, Illinois

Sam, Janette – presenter; Rajapakshe R, Sam J, Mar C, Liang P, Graham-Knight J, Wright Q, Shen H, Park H, Park E, Kim K. Limitations of downsampling of mammography images in micro-calcification detection by AI algorithms; an initial clinical experience. [Abstract] 2022 RSNA; Nov 27– Dec 1, 2022, Chicago, Illinois

Rasika Rajapakshe

Rajapakshe R, Sam J, Mar C, Liang P, Graham-Knight J, Wright Q, Shen H, Park H, Park E, Kim K. Detailed External Validation of A Commercial AI Algorithm for Breast Cancer Detection in The Setting of An Organized Population-based Breast Screening Program [Abstract] 2022 RSNA; Nov 27 – Dec 1, 2022, Chicago, Illinois

Rajapakshe R, Sam J, Mar C, Liang P, Graham-Knight J, Wright Q, Shen H, Park H, Park E, Kim K. Limitations of downsampling of mammography images in micro-calcification detection by AI algorithms; an initial clinical experience. [Abstract] 2022 RSNA; Nov 27– Dec 1, 2022, Chicago, Illinois

Amanda Hunter

Emily Charles – Presenter, Amanda Hunter. MagView Reporting Workflows FAQs Webinar. Vancouver, BC, July 18, 2022

Amanda Hunter, Emily Charles. Centre Case Review FAQs Webinar. Vancouver, BC, November 1, 2022

APPENDIX 11 – BREAST SCREENING PROGRAM / BC CANCER CONTACT INFORMATION (ALPHABETICAL LISTING BY SURNAME)

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