BC CANCER SCREENING

Provincial Health Services Authority

Screening Performance Report

2013-2016

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Message from Dr. John Spinelli

Almost every British Columbian has been affected by cancer, either by personal experience or through a family member, friend or colleague who has been diagnosed with the disease. It is estimated that nearly one in two British Columbians will be diagnosed with cancer in their lifetime, and nearly one in four will die from it. The number of newly diagnosed cases of cancer has been steadily increasing each year, primarily due to an aging population. In 2017, approximately 27,500 British Columbians were diagnosed with cancer, but by 2030 that number is expected to increase to over 38,000– that's nearly a 40% increase in just 13 years.

These are startling statistics, but through routine screening, we can reduce cancer incidence and mortality. Rigorous evidence reviews are undertaken regularly to develop and refresh cancer screening guidelines. At the national level, the Canadian Task Force on Preventive Health Care (CTFPHP) established by the Public Health Agency of Canada develops cancer screening guidelines to support primary care providers in delivering preventive health care. Here in British Columbia, the Lifetime Prevention Schedule (LPS) has been established by Office of the Provincial Health Officer to assess potential prevention services for British Columbians, ensuring they are cost-effective and have a significant positive impact on population health. By screening asymptomatic individuals at the appropriate intervals, we can decrease the number of cancer deaths by finding and treating cancer at a stage when it is curable. Some screening tests can also identify pre-cancerous conditions, which when treated, can reduce the number of cancer diagnoses, and improve quality of life.

British Columbia currently offers three organized cancer screening programs, for which there is strong evidence of benefit. These are for cancers of the cervix, breast and colon. All screening tests have inherent limitations and could yield false positive results that lead to additional tests in people with no cancer, and diagnosis of cancers which may not cause harm in the person's lifetime. An organized screening program, such as we have in British Columbia, is designed to support informed decision-making about screening, and to ensure a high quality screening system so that benefits are maximized and undesirable effects are minimized.

As you will read in the following sections, British Columbia has a long and proud history of providing organized cancer screening. British Columbia was the first in the world to set up population-based cervical cancer screening in 1955, and was the first in Canada to start the breast cancer screening program in 1989. Both programs have contributed to a significant reduction in mortality from cervical and breast cancers. Building on the experiences of these programs, BC Cancer has overseen the development and implementation of a colon cancer screening program for British Columbia in 2013.

BC Cancer produces annual reports for each of the three screening programs separately. This is the first time that key performance measures from all three programs are presented in a single report. In addition, the report has a special focus on diagnostic wait times. This is the time between having an abnormal screening test and the diagnostic investigation. It has been chosen as the focus of this report because it is a key factor in ensuring that cancer screening reduces mortality and improves quality of life for those individuals that make an informed decision to screen.

The end of this report outlines some of the future directions around cancer screening in British Columbia. We hope that this report will assist BC Cancer and its many partners involved in cancer screening, to continue to provide the highest quality cancer screening programs.
Sincerely,

Dr. John Spinelli
Vice President, Population Oncology
BC Cancer

BC Cancer Screening Programs

Screening Partnership Framework

Cancer Screening in B.C. is organized under a partnership framework with regional health authorities, community imaging and laboratory services and primary care providers. BC Cancer provides oversight for organized cancer screening in B.C., and supports:

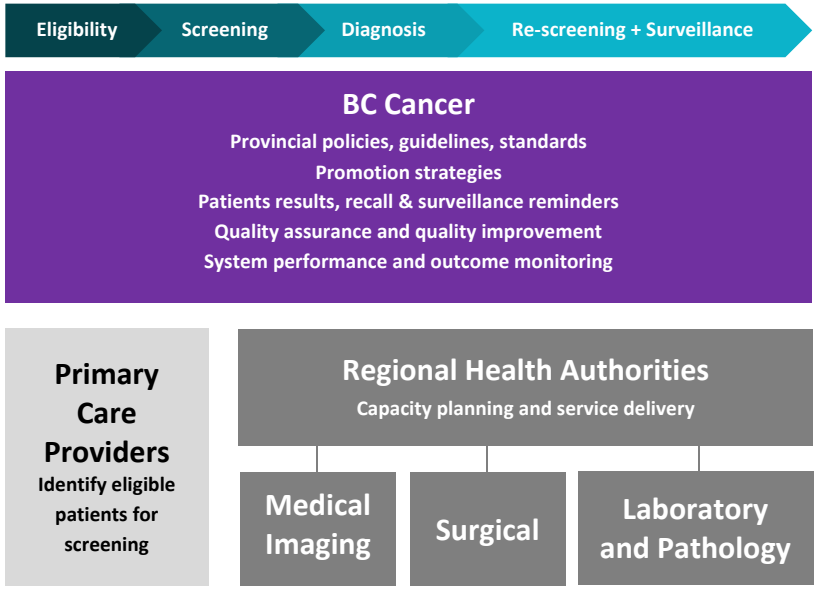
- development of provincial policies, guidelines and standards,
- strategies to increase public and health care provider awareness, including both benefits and limitations of screening,
- correspondences to eligible British Columbians about results, follow-up and rescreening,
- quality assurance and quality improvement, and
- reporting and monitoring of system performance and screening outcomes.

In B.C., regional health authorities (RHAs) are responsible for the planning and delivery of healthcare services within their geographic areas. RHAs and community health service providers work with BC Cancer Screening to provide high quality screening and diagnostic investigation services.

Primary care providers play the important role of identifying eligible individuals for screening. BC Cancer provides material to help primary care providers discuss the benefits and limitations of screening with their patients. Once the decision to screen is made, the primary care provider directs the patient to the appropriate screening test, and supports them throughout their screening journey.

In addition, as part of the Indigenous Cancer Strategy, BC Cancer Screening is working collaboratively with the First Nations Health authority (FNHA), Métis Nation British Columbia and the BC Association of Aboriginal Friendship Centres to improve cancer screening access and participation of Indigenous people.

Figure 1: Screening Partnership Framework



Timeline of Cancer Screening in BC

1949: BC Cancer initiated a pilot project to determine the efficacy of Papanicolaou (Pap) test in detecting precancerous conditions of the cervix.

1955: BC Cancer set up the first population-based screening program to determine if annual Pap tests in women over the age of 20 would reduce the incidence and mortality of cervical cancer in B.C.

1973: BC Cancer started a provincial colposcopy program to improve clinical management of pre-invasive cervical lesions detected by cervical screening.

1988: A manuscript showing how 30 years of organized screening in British Columbia reduced cervical cancer incidence and mortality rates by over 70% was published in the British Medical Journal.

Overview: Breast Screening

BC Cancer Breast Screening Program was the first population-based breast screening program in Canada. The program started in 1988 with one pilot clinic in Vancouver. Over the years, BC Cancer gradually expanded screening access by establishing service agreements with public and community imaging clinics around the province. By 2000, most eligible women in B.C. could access high quality screening at a fixed clinic or mobile service location within reasonable travel. The last BC Cancer Breast Screening clinic in Sechelt was added in 2011. To date, there are 36 fixed centres across the province, and three mobile vans that visit over 170 smaller B.C. communities, including many First Nations communities.

The recommended test for breast cancer screening is a standard two-view bilateral mammogram (x-ray of the breast). Women between ages 40-74 may self-refer to the program. Average risk women are recommended to have a screening mammogram every two years starting at age 50, while women at higher risk (e.g. have a family history of breast cancer in first degree relatives) are recommended to have a screening mammogram annually starting at age 40.

The Fast Track process to facilitate direct referral of women with abnormal screening result to a designated imaging facility for further testing was established in 1999 as a voluntary process for women and their health care providers. By 2010, with endorsement from the Society of General Practitioners, the Fast Track process became the standard of care for all women requiring further testing after screening.

Overview: Cervix Screening

BC Cancer clinicians initiated a pilot project in 1949 to determine the efficacy of the Papanicolaou (Pap) test in detecting precancerous conditions of the cervix. A Pap test is a procedure that involves health care providers sending a small sample of cells collected from the patient's cervix to the laboratory for examination under a microscope. By 1955, the value of Pap tests was established and a decision was made to determine whether annual Pap tests in women over the age of 20 would reduce the incidence and mortality of cervical cancer in B.C.. This led to the first population-based cancer screening program in the world.

As colposcopy become the standard technique to investigate cytological abnormalities (cell sample) found during cervix screening, a series of hospital-based colposcopy clinics in B.C. began to organize and integrate with the Cervix Screening Program in 1973. All Pap test results and colposcopy data are maintained in a centralized database at BC Cancer. From 1955 to 1985, incidence and mortality of invasive cervical cancer in B.C. fell steadily, by over 70% in the 30-year period (1).

In 2005, laboratory services within the Provincial Health Services Authority were consolidated under an overarching management structure. This resulted in the separation of the cervical cancer screening laboratory operations from BC Cancer. Consolidation of laboratory services continued across the Lower Mainland in the ensuing years. Throughout healthcare organization changes, BC Cancer and the laboratory services continue to work in partnership to ensure high quality cervix screening for the province.

B.C.'s cervix screening guidelines were updated in 2016. The guidelines recommend that average risk women between ages 25-69 have a Pap test every three years.

Timeline of Cancer Screening in BC

1988: Screening Mammography pilot program for breast cancer screening began with one centre performing 9000 screens at a cost of $35 per screen.

1989: BC Cancer established the provincial Screening Mammography Program with a multi-year plan to expand screening access across the province.

1990: First mobile screening mammography unit began servicing women in Interior. There are now three state-of-art Breast Screening mobile units visiting over 170 communities across B.C., including many First Nations communities.

1999: The Fast Track process to facilitate referral of women with abnormal screening mammogram to a designated imaging facility for further testing became available.

Overview: Colon Screening

The BC Cancer Colon Screening Program was implemented province-wide in November 2013. Between 2009 and 2013, colon screening was offered in three communities as a pilot project. In the pilot project, eligible individuals self-referred for screening. The current colon screening process in B.C. is initiated by primary care providers.

The primary care provider determines the patient's eligibility and discusses screening with these individuals. Once there is a decision to screen, the primary care provider orders the appropriate screening test. In B.C., average risk men and women between the ages 50-74 are recommended to have a fecal immunochemical test (FIT) every two years. Men and women between ages 50-74 with a significant family history of colon cancer or a personal history of adenoma(s) are recommended to have a colonoscopy every five years.

FIT is ordered using the provincial standardized laboratory requisition form. Laboratories copy FIT results to the BC Cancer Colon Screening Program only if this option is selected on the requisition form. Colonoscopy referral for higher than average risk individuals are sent directly to the BC Cancer Colon Screening Program. BC Cancer Colon Screening forwards colonoscopy referrals and abnormal FIT results to the designated health authority colonoscopy processing center to initiate assessment and colonoscopy booking.

Average Risk Cancer Screening Guidelines

Breast	Cervix	Colon
Women Age 50-74 Mammogram every two years *Age 40-49: talk to doctor about benefits and limitations of screening. If screening is chosen, mammogram every two years* *Age 75+: talk to doctor about benefits and limitations of screening. If screening is chosen, mammogram every 2-3 years*	Women Age 25-69 Pap test every three years	Men and Women Age 50-74 FIT every two years

References

1. Anderson GH, Boyes DA, Benedet JL, LeRiche JC, Matisic JP, Suen KC, Worth AJ, Millner A, Bennett OM. Organization and results of the cervical cytology screening programme in British Columbia, 1955-1985. Br Med J (Clin Res Ed). 1988 Apr 2; 296(6627): 975–978.

Timeline of Cancer Screening in BC

2000: BC Cancer Breast Screening achieved provincial coverage with 36 fixed and mobile centres enabling all women in B.C. to have reasonable access.

2009: Colon Check pilot program for colon cancer screening started in Penticton, and expanded to Power River and parts of Vancouver in the following years.

2013: Fecal immunochemical test (FIT) for colon cancer screening became available at all B.C. labs and the provincial Colon Screening Program with enhanced Regional Health Authority colonoscopy clinics, was established.

2018: BC Cancer rebrands screening programs under the BC Cancer Screening banner: Breast Screening, Colon Screening, Cervix Screening.

Cancer Screening Pathways in British Columbia

The standard pathway for any cancer screening process has four phases: eligibility or risk assessment, screening test, diagnostic investigation, and rescreening and surveillance for those eligible. The screening pathway for each program is illustrated below.

Figure 2: Breast Screening Pathway

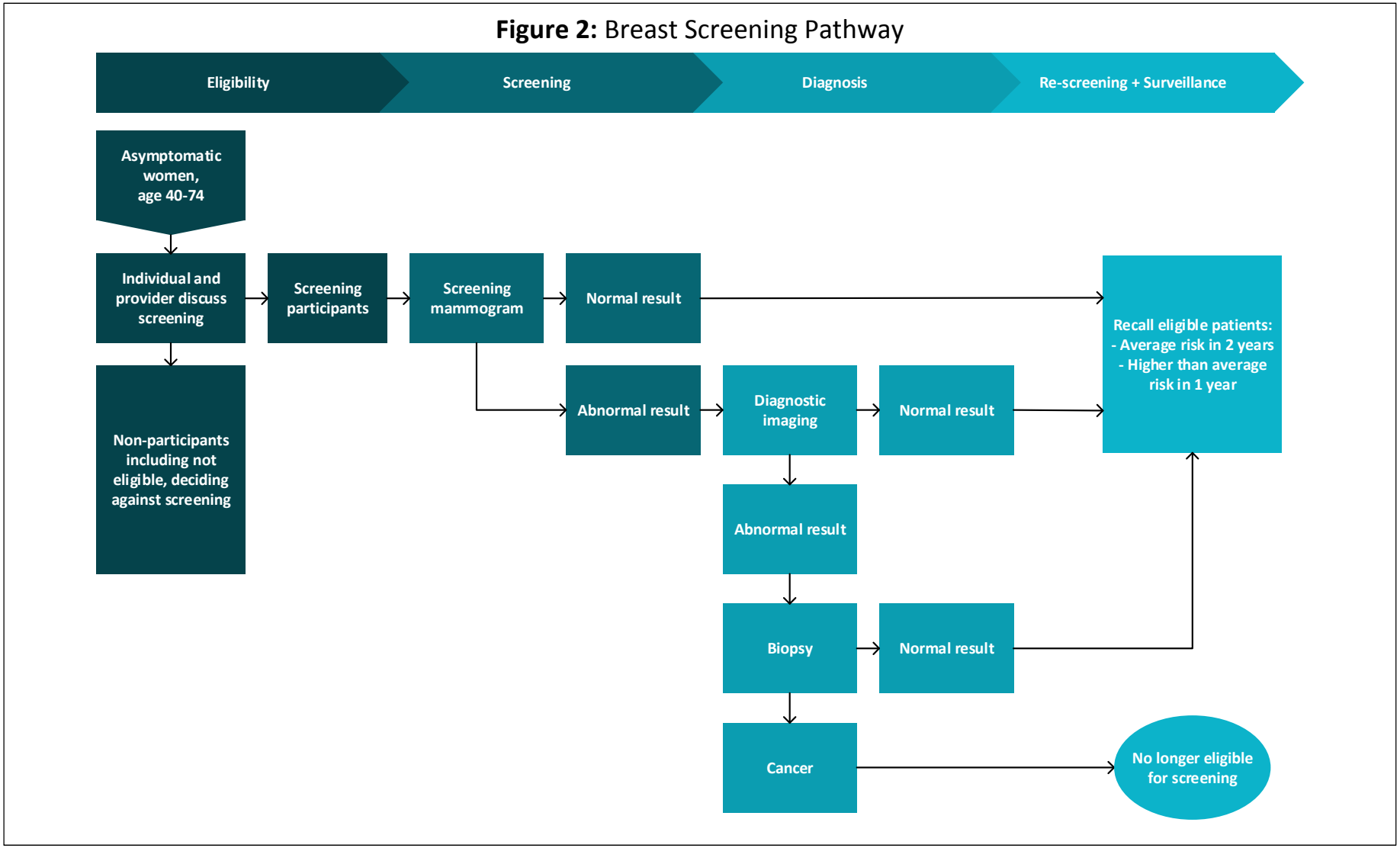


Figure 3: Cervix Screening Pathway

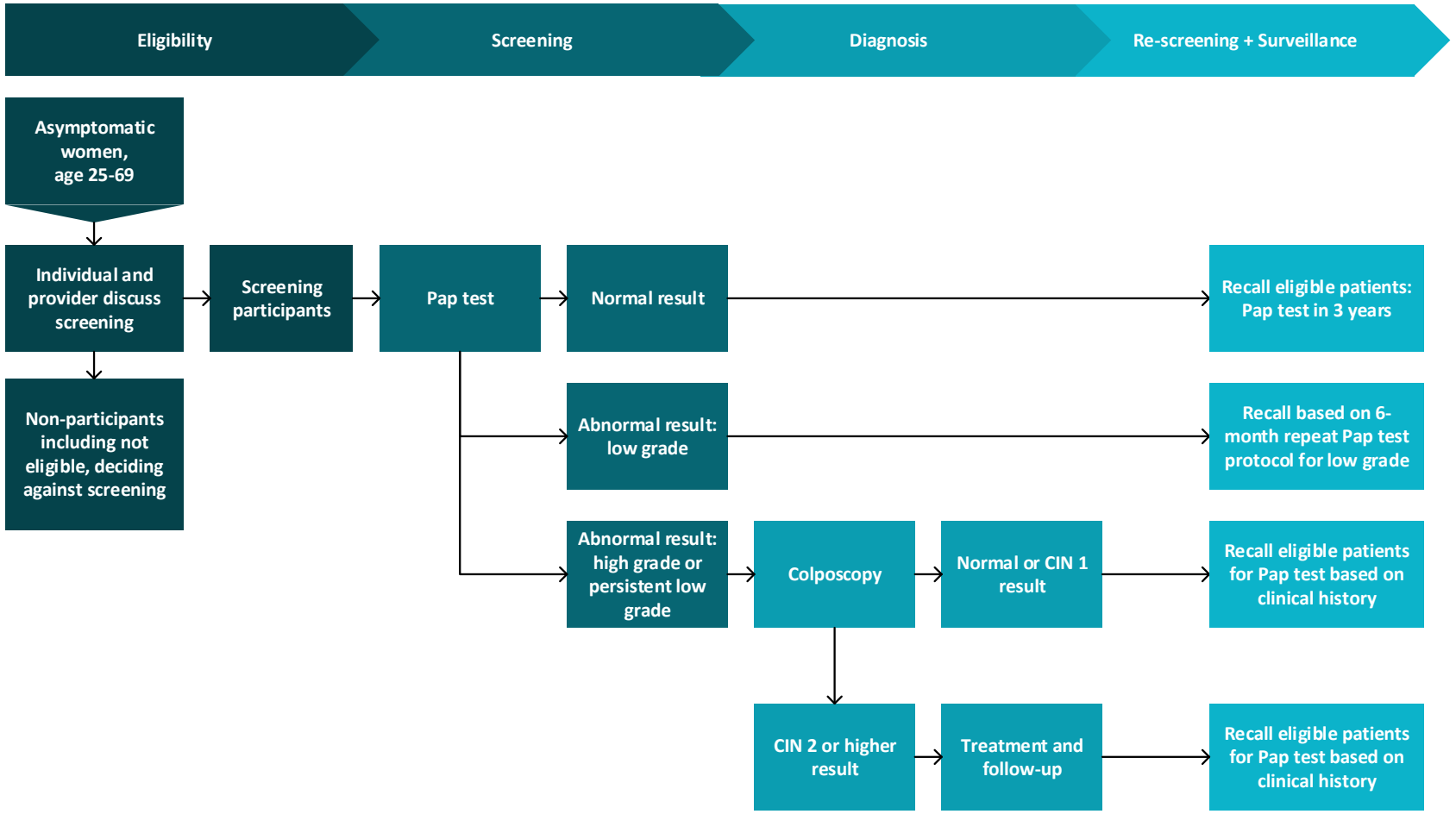
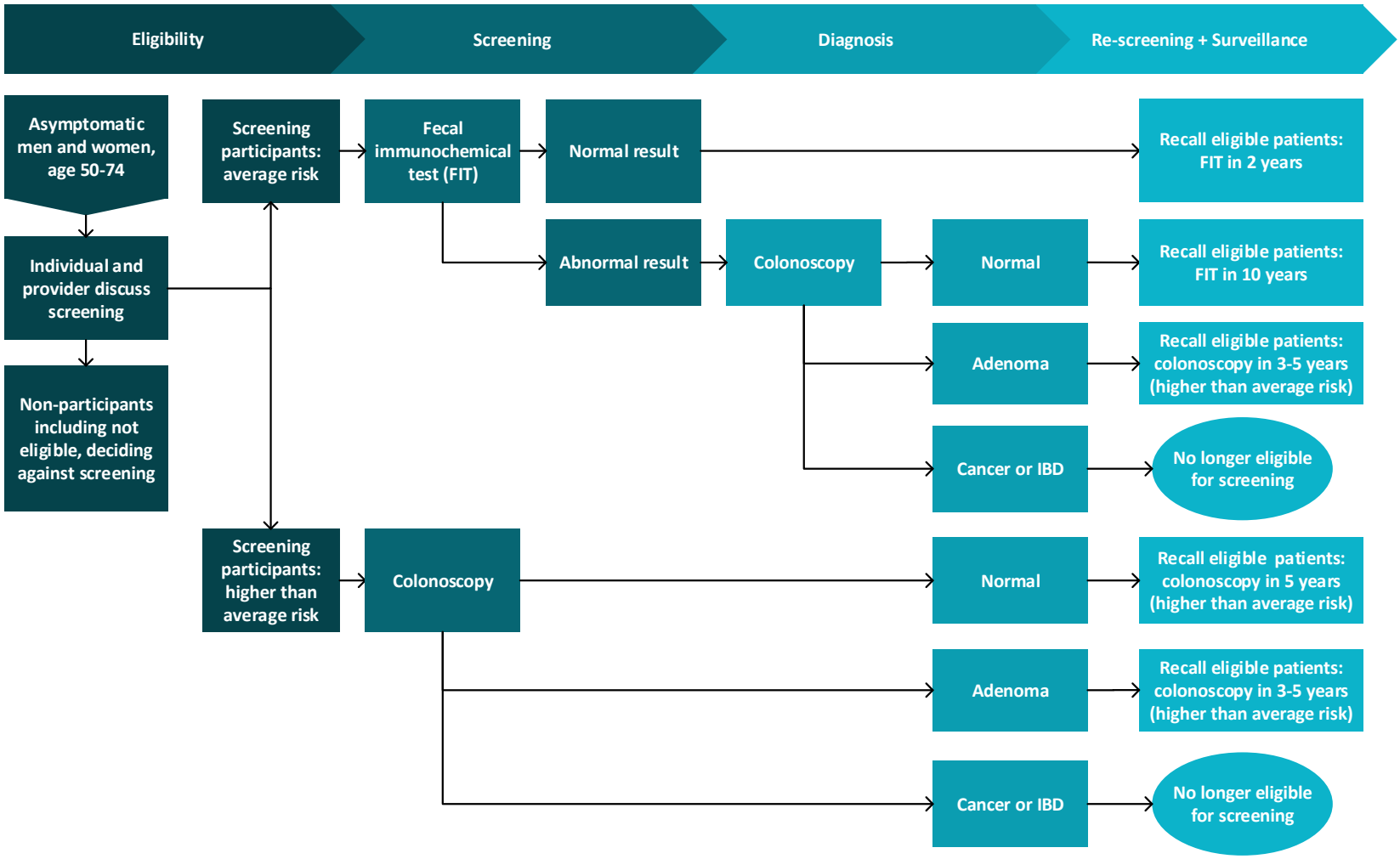


Figure 4: Colon Screening Pathway



Cancer Screening Performance Summary

Key Performance Indicators

BC Cancer Screening has adopted an integrated evaluation framework developed under the Canadian Partnership Against Cancer (CPAC), for the purpose of promoting consistency in measuring screening performance across Canada. The evaluation framework identifies five key domains along the screening pathway for the average risk population (Table 1).

Table 1: Cancer Screening Evaluation Framework

Domain	Performance Indicators
■ Coverage	• Participation • Retention
■ Follow-up	• Proportion of screening tests with abnormal results • Follow-up of abnormal screening results • Diagnostic interval (time between abnormal screening result and diagnosis)
■ Quality of screening	• Positive predictive value of screening tests
■ Detection	• Pre-cancer detection rate • Cancer detection rate

For this system performance reporting, BC Cancer Screening selected performance indicators based on availability of standardized data definitions and collection methods, data quality, and ability to provide regional comparisons.

There is an exception in Colon Screening performance reporting. At this time, Northern Health Authority follows their own colon screening processes for referral and recall, and does not provide outcome data to the provincial BC Cancer Colon Screening Program. Thus, there is no Colon Screening performance reporting for Northern Heath Authority.

Trends and Insights

This section provides system performance data at the health service delivery area (HSDA) level over four years. Here are some observations from the performance data.

Breast Screening

- Participation and retention in the Breast Screening Program appear to have plateaued, and started declining slightly from 2013 to 2016 across the province.
- Detection of invasive breast cancers has improved slightly in British Columbia; but the positive predictive value of screening mammography has declined, indicating more women are experiencing false positive screening results.
- The percentage meeting the diagnostic wait time target for breast screening has declined slightly for both women requiring tissue biopsy and those who do not.

Cervix Screening

- Participation and retention in the Cervix Screening Program appear to have plateaued, and started declining slightly from 2013 to 2016 across the province.
- Abnormal screening result rates are relatively stable across the province.
- The rate of pre-cancerous lesions varies by region and is higher in Interior, Vancouver Island and Northern Health Authorities.
- Diagnostic wait times for cervix screening have improved in three health authorities.

Colon Screening

- Participation in Colon Screening Program has increased steadily since it started at the end of 2013.
- Retention rates from the early participants are low in comparison with Breast and Cervix Screening Programs.
- Abnormal FIT rates and colon cancer rates vary by region, and are both higher for Interior and Vancouver Island Health Authorities. These two health authorities also have the highest positive predictive values for FIT.
- Positive predictive value of FIT is comparable to Pap tests, and both are significantly higher than screening mammography.
- Diagnostic wait times have improved in four health authorities.

The findings identify successes and areas of concern to start dialogue with our partners in cancer screening. We hope this report will be used to develop informed and locally relevant strategies to continuously improve the cancer screening system for British Columbians.

Breast Screening Performance Summary

Table 2: Breast Screening Participation

Percentage of British Columbia screen-eligible women, ages 50-74, who had a screening mammogram within a 30-month period with the BC Cancer Breast Screening Program.

	2013	2014	2015	2016
B.C. Total	**55.5**	**54.3**	**53.8**	**53.3**
Interior Health Authority	**55.4**	**53.4**	**53.2**	**52.7**
East Kootenay HSDA	51.4	50.7	51.2	49.5
Kootenay Boundary HSDA	47.2	45.8	45.6	46.6
Okanagan HSDA	58.6	55.9	55.5	55.4
Thompson Cariboo Shuswap HSDA	54.6	53.2	52.9	51.4
Fraser Health Authority	**54.5**	**53.9**	**53.4**	**52.9**
Fraser East HSDA	54.7	53.4	52.6	52.1
Fraser North HSDA	54.9	54.8	54.5	53.9
Fraser South HSDA	54.0	53.4	52.7	52.4
Vancouver Coastal Health Authority	**55.8**	**54.3**	**53.5**	**53.1**
Richmond HSDA	58.6	55.6	54.0	53.8
Vancouver HSDA	54.1	52.7	51.9	51.5
North Shore/Coast Garibaldi HSDA	57.1	56.5	56.4	56.0
Vancouver Island Health Authority	**56.8**	**55.9**	**55.2**	**54.3**
South Vancouver Island HSDA	56.4	56.1	55.7	54.7
Central Vancouver Island HSDA	57.7	56.2	55.0	54.3
North Vancouver Island HSDA	56.1	54.7	54.1	53.3
Northern Health Authority	**50.9**	**50.1**	**50.3**	**49.7**
Northwest HSDA	49.7	48.8	49.9	49.7
Northern Interior HSDA	55.9	54.3	53.9	53.1
Northeast HSDA	39.0	40.3	41.2	40.7

Table 3: Breast Screening Retention

Percentage of BC Cancer Breast Screening Program participants, ages 50-72, who returned for screening mammogram within 30 months.

	2013	2014	2015	2016
B.C. Total	**73.3**	**72.4**	**72.7**	**72.4**
Interior Health Authority	**72.4**	**71.6**	**72.0**	**72.8**
East Kootenay HSDA	68.7	68.5	67.2	67.2
Kootenay Boundary HSDA	69.4	69.5	69.7	71.8
Okanagan HSDA	73.7	72.6	73.5	74.5
Thompson Cariboo Shuswap HSDA	72.3	71.5	71.5	71.8
Fraser Health Authority	**74.0**	**72.9**	**72.7**	**72.1**
Fraser East HSDA	72.0	71.4	71.1	70.5
Fraser North HSDA	74.4	73.5	73.2	72.3
Fraser South HSDA	74.5	73.1	72.9	72.4
Vancouver Coastal Health Authority	**74.2**	**73.4**	**73.8**	**73.1**
Richmond HSDA	76.1	75.1	75.8	75.1
Vancouver HSDA	73.7	73.3	73.4	72.6
North Shore/Coast Garibaldi HSDA	73.6	72.3	73.1	72.4
Vancouver Island Health Authority	**73.6**	**72.5**	**73.4**	**72.8**
South Vancouver Island HSDA	74.0	73.5	74.1	72.9
Central Vancouver Island HSDA	73.4	71.8	72.9	73.0
North Vancouver Island HSDA	72.8	71.6	72.4	72.3
Northern Health Authority	**67.7**	**67.8**	**69.1**	**69.3**
Northwest HSDA	66.2	66.0	68.5	68.0
Northern Interior HSDA	70.4	69.0	69.2	70.0
Northeast HSDA	60.6	65.9	69.6	68.7

Table 4: Breast Screening Abnormal Call Rate

Percentage of BC Cancer Breast Screening Program mammography participants, ages 50-74, that are identified as abnormal and referred for further testing.

	2013	2014	2015	2016
B.C. Total	**6.8**	**7.8**	**8.2**	**8.1**
Interior Health Authority	**6.2**	**6.7**	**8.1**	**8.0**
East Kootenay HSDA	8.8	7.6	8.8	7.6
Kootenay Boundary HSDA	6.3	5.6	7.0	8.2
Okanagan HSDA	5.8	6.7	7.2	6.8
Thompson Cariboo Shuswap HSDA	6.0	6.7	9.8	10.5
Fraser Health Authority	**8.1**	**9.1**	**9.5**	**9.2**
Fraser East HSDA	9.4	8.3	8.0	9.1
Fraser North HSDA	7.5	9.0	9.6	8.4
Fraser South HSDA	8.1	9.5	10.0	9.9
Vancouver Coastal Health Authority	**6.8**	**8.8**	**9.0**	**8.6**
Richmond HSDA	6.2	10.6	12.0	10.2
Vancouver HSDA	7.2	8.4	8.5	8.3
North Shore/Coast Garibaldi HSDA	6.3	8.2	7.7	7.9
Vancouver Island Health Authority	**5.1**	**5.6**	**5.7**	**5.9**
South Vancouver Island HSDA	4.6	4.6	4.9	5.2
Central Vancouver Island HSDA	5.4	6.6	6.9	6.8
North Vancouver Island HSDA	5.8	5.9	5.0	6.0
Northern Health Authority	**7.5**	**7.5**	**7.0**	**7.0**
Northwest HSDA	5.9	6.4	6.4	6.4
Northern Interior HSDA	7.2	7.3	6.6	6.4
Northeast HSDA	10.9	9.9	9.1	9.6

Table 5: Breast Screening to Diagnosis (with tissue biopsy) Time Interval

Percentage of BC Cancer Breast Screening Program participants, ages 50–74, with an abnormal screening mammogram result completed diagnostic work-up within seven weeks after screening, when a tissue biopsy is required.

	2013	2014	2015	2016
B.C. Total	**64.1**	**61.6**	**59.4**	**60.4**
Interior Health Authority	**75.1**	**70.5**	**64.3**	**67.2**
East Kootenay HSDA	43.9	58.6	61.8	48.7
Kootenay Boundary HSDA	64.1	65.0	68.2	37.0
Okanagan HSDA	81.8	68.3	66.8	74.3
Thompson Cariboo Shuswap HSDA	76.7	76.7	59.8	69.7
Fraser Health Authority	**52.6**	**54.5**	**53.7**	**49.3**
Fraser East HSDA	52.5	54.7	45.1	27.3
Fraser North HSDA	47.4	45.5	48.5	38.1
Fraser South HSDA	56.4	61.5	59.5	62.9
Vancouver Coastal Health Authority	**65.1**	**55.9**	**53.6**	**63.9**
Richmond HSDA	52.9	45.9	45.4	56.8
Vancouver HSDA	70.7	62.8	58.1	68.1
North Shore/Coast Garibaldi HSDA	58.8	47.7	51.2	58.6
Vancouver Island Health Authority	**82.8**	**82.6**	**83.0**	**79.2**
South Vancouver Island HSDA	92.4	90.2	91.2	89.5
Central Vancouver Island HSDA	83.2	82.0	80.0	78.8
North Vancouver Island HSDA	63.2	69.8	75.9	64.6
Northern Health Authority	**56.4**	**50.5**	**50.4**	**51.6**
Northwest HSDA	52.4	30.8	47.8	53.8
Northern Interior HSDA	56.6	61.7	52.4	54.3
Northeast HSDA	61.5	40.0	42.9	30.0

Table 6: Breast Screening to Diagnosis (without tissue biopsy) Time Interval

Percentage of BC Cancer Breast Screening Program participants, ages 50–74, with an abnormal screening mammogram result completed diagnostic work-up within five weeks after screening, when no tissue biopsy is required.

	2013	2014	2015	2016
B.C. Total	**88.0**	**86.1**	**84.5**	**82.8**
Interior Health Authority	**89.5**	**87.7**	**86.7**	**85.1**
East Kootenay HSDA	75.1	75.1	77.7	73.4
Kootenay Boundary HSDA	86.4	91.9	85.9	74.5
Okanagan HSDA	92.4	90.9	90.2	91.6
Thompson Cariboo Shuswap HSDA	92.5	86.1	85.0	83.3
Fraser Health Authority	**85.4**	**89.1**	**86.0**	**79.6**
Fraser East HSDA	73.2	84.7	65.0	59.2
Fraser North HSDA	90.9	87.0	89.0	78.2
Fraser South HSDA	87.3	92.3	91.0	88.0
Vancouver Coastal Health Authority	**88.6**	**75.6**	**76.2**	**79.4**
Richmond HSDA	90.5	60.4	57.7	58.5
Vancouver HSDA	88.2	76.6	80.1	81.9
North Shore/Coast Garibaldi HSDA	87.9	86.7	89.5	94.1
Vancouver Island Health Authority	**94.2**	**94.5**	**93.4**	**95.3**
South Vancouver Island HSDA	98.3	96.2	96.6	97.8
Central Vancouver Island HSDA	95.5	96.0	91.1	93.9
North Vancouver Island HSDA	82.6	86.7	90.7	92.6
Northern Health Authority	**83.9**	**87.4**	**81.9**	**80.1**
Northwest HSDA	69.4	73.9	67.4	66.0
Northern Interior HSDA	90.3	94.6	86.3	89.5
Northeast HSDA	81.5	82.4	87.3	76.2

Table 7: Mammography Positive Predictive Value

Percentage of abnormal mammograms in BC Cancer Breast Screening Program participants, ages 50–74, diagnosed with breast cancer (invasive or ductal carcinoma in situ) after diagnostic work-up.

	2013	2014	2015	2016
B.C. Total	**8.4**	**7.8**	**7.3**	**7.4**
Interior Health Authority	**9.1**	**9.1**	**7.7**	**7.3**
East Kootenay HSDA	4.7	6.0	5.5	6.6
Kootenay Boundary HSDA	8.2	5.5	9.1	5.5
Okanagan HSDA	9.9	8.8	9.1	8.8
Thompson Cariboo Shuswap HSDA	9.9	11.6	6.2	6.1
Fraser Health Authority	**7.4**	**6.7**	**6.6**	**7.1**
Fraser East HSDA	5.5	8.5	6.2	6.1
Fraser North HSDA	8.2	6.0	6.9	7.7
Fraser South HSDA	7.6	6.8	6.6	7.1
Vancouver Coastal Health Authority	**8.7**	**7.4**	**6.8**	**6.7**
Richmond HSDA	7.7	6.2	6.2	6.7
Vancouver HSDA	8.9	8.5	6.8	7.6
North Shore/Coast Garibaldi HSDA	9.0	6.5	7.5	5.1
Vancouver Island Health Authority	**10.7**	**10.7**	**9.9**	**9.7**
South Vancouver Island HSDA	10.5	11.0	10.9	9.7
Central Vancouver Island HSDA	10.6	10.7	9.5	9.7
North Vancouver Island HSDA	11.4	9.8	8.3	9.7
Northern Health Authority	**7.1**	**5.5**	**7.3**	**6.7**
Northwest HSDA	9.8	6.3	8.9	5.8
Northern Interior HSDA	7.9	5.9	8.3	8.1
Northeast HSDA	3.0	3.8	3.4	4.6

Table 8: Breast Screening Invasive Cancer Detection Rate

Number of invasive breast cancers detected per 1,000 screening mammograms in BC Cancer Breast Screening Program participants, ages 50-74.

	2013	2014	2015	2016
B.C. Total	**4.5**	**4.9**	**4.7**	**4.8**
Interior Health Authority	**4.7**	**5.1**	**4.9**	**4.4**
East Kootenay HSDA	3.5	4.2	4.5	3.0
Kootenay Boundary HSDA	3.9	3.1	5.2	3.3
Okanagan HSDA	4.8	5.0	5.2	4.5
Thompson Cariboo Shuswap HSDA	5.0	6.1	4.6	5.3
Fraser Health Authority	**4.5**	**4.8**	**4.6**	**5.2**
Fraser East HSDA	4.2	5.7	3.8	4.4
Fraser North HSDA	4.4	4.1	4.6	5.1
Fraser South HSDA	4.7	5.1	4.8	5.7
Vancouver Coastal Health Authority	**4.4**	**4.9**	**4.6**	**4.7**
Richmond HSDA	2.9	5.1	5.4	5.8
Vancouver HSDA	4.9	5.3	4.2	5.2
North Shore/Coast Garibaldi HSDA	4.5	4.1	4.8	3.3
Vancouver Island Health Authority	**4.7**	**5.0**	**4.6**	**4.7**
South Vancouver Island HSDA	4.3	4.7	4.8	4.4
Central Vancouver Island HSDA	4.8	5.3	5.0	5.0
North Vancouver Island HSDA	5.5	5.0	3.3	4.9
Northern Health Authority	**4.3**	**3.6**	**4.4**	**4.0**
Northwest HSDA	4.8	2.7	5.2	3.3
Northern Interior HSDA	4.8	3.9	4.7	4.2
Northeast HSDA	2.0	3.8	2.4	4.4

Cervix Screening Performance Summary

Table 9: Cervix Screening Participation

Percentage of British Columbia screen-eligible women, ages 25-69, who completed a Pap test within a 42-month period with the BC Cancer Cervix Screening Program.

	2013	2014	2015	2016
BC Total	**73.6**	**72.9**	**72.5**	**72.7**
Interior Health Authority	**75.8**	**74.6**	**74.1**	**73.8**
East Kootenay HSDA	79.6	79.0	79.4	79.4
Kootenay Boundary HSDA	78.3	76.9	76.5	76.1
Okanagan HSDA	78.7	77.3	76.6	76.0
Thompson Cariboo Shuswap HSDA	68.8	67.8	67.5	67.5
Fraser Health Authority	**68.6**	**68.0**	**67.6**	**67.5**
Fraser East HSDA	67.0	65.6	64.7	64.2
Fraser North HSDA	70.0	69.7	69.6	69.6
Fraser South HSDA	67.9	67.4	67.0	66.9
Vancouver Coastal Health Authority	**74.9**	**74.7**	**75.2**	**75.1**
Richmond HSDA	70.3	69.3	69.0	68.5
Vancouver HSDA	72.3	72.3	73.1	73.0
North Shore/Coast Garibaldi HSDA	85.3	85.1	85.9	85.9
Vancouver Island Health Authority	**75.8**	**74.9**	**74.5**	**74.3**
South Vancouver Island HSDA	76.0	75.6	75.9	76.1
Central Vancouver Island HSDA	74.8	73.7	72.5	71.6
North Vancouver Island HSDA	77.0	75.4	74.7	74.2
Northern Health Authority	**69.5**	**69.8**	**70.5**	**69.6**
Northwest HSDA	72.4	72.8	74.6	74.4
Northern Interior HSDA	70.0	70.5	70.9	70.1
Northeast HSDA	65.5	65.3	65.3	63.8

Table 10: Cervix Screening Retention

Percentage of BC Cancer Cervix Screening Program participants, ages 25-66, who returned for a subsequent pap test within 42-months of a normal Pap test result.

	2013	2014	2015	2016
BC Total	**82.8**	**82.4**	**81.8**	**81.6**
Interior Health Authority	**84.5**	**84.2**	**84.2**	**83.9**
East Kootenay HSDA	85.0	84.4	85.5	85.1
Kootenay Boundary HSDA	83.6	84.1	82.9	83.0
Okanagan HSDA	86.3	85.6	85.1	84.9
Thompson Cariboo Shuswap HSDA	81.4	81.5	82.3	81.9
Fraser Health Authority	**82.2**	**82.4**	**81.8**	**81.1**
Fraser East HSDA	78.5	79.5	78.6	77.6
Fraser North HSDA	83.7	83.8	83.0	82.6
Fraser South HSDA	81.9	82.1	81.6	80.9
Vancouver Coastal Health Authority	**84.0**	**84.1**	**83.8**	**82.4**
Richmond HSDA	85.0	84.8	85.0	83.5
Vancouver HSDA	83.0	83.1	82.7	81.1
North Shore/Coast Garibaldi HSDA	85.5	85.7	85.6	84.3
Vancouver Island Health Authority	**83.8**	**84.0**	**83.5**	**83.3**
South Vancouver Island HSDA	85.0	85.5	85.2	84.3
Central Vancouver Island HSDA	82.6	82.2	81.4	81.6
North Vancouver Island HSDA	82.9	83.0	82.4	83.5
Northern Health Authority	**78.4**	**78.0**	**76.7**	**75.3**
Northwest HSDA	78.4	78.3	77.1	77.9
Northern Interior HSDA	79.6	78.9	77.9	76.1
Northeast HSDA	75.5	75.4	73.4	70.6

Table 11: Cervix Screening Low Grade Abnormal Rate

Percentage of BC Cancer Cervix Screening Program participants, ages 25-69, with a low grade abnormal Pap test result.

	2013	2014	2015	2016
BC Total	**2.1**	**2.0**	**2.2**	**1.9**
Interior Health Authority	**2.1**	**2.0**	**2.2**	**1.9**
East Kootenay HSDA	3.1	3.0	2.8	2.6
Kootenay Boundary HSDA	3.1	2.2	2.7	2.2
Okanagan HSDA	3.0	2.7	3.0	2.5
Thompson Cariboo Shuswap HSDA	2.8	2.6	2.9	2.5
Fraser Health Authority	**2.1**	**2.0**	**2.2**	**1.9**
Fraser East HSDA	2.7	2.7	2.8	2.3
Fraser North HSDA	2.3	2.1	2.3	1.8
Fraser South HSDA	2.3	2.2	2.4	2.0
Vancouver Coastal Health Authority	**2.1**	**2.0**	**2.2**	**1.9**
Richmond HSDA	1.9	1.9	1.8	1.6
Vancouver HSDA	2.8	2.5	2.7	2.3
North Shore/Coast Garibaldi HSDA	2.5	2.2	2.5	2.0
Vancouver Island Health Authority	**2.1**	**2.0**	**2.2**	**1.9**
South Vancouver Island HSDA	2.9	2.5	2.7	2.2
Central Vancouver Island HSDA	2.7	2.5	2.9	2.3
North Vancouver Island HSDA	2.7	2.7	2.9	2.2
Northern Health Authority	**2.1**	**2.0**	**2.2**	**1.9**
Northwest HSDA	3.7	3.2	3.5	2.9
Northern Interior HSDA	3.0	3.2	3.4	2.9
Northeast HSDA	3.8	3.4	3.6	3.1

Table 12: Cervix Screening High Grade Abnormal Rate

Percentage of BC Cancer Cervix Screening Program participants, ages 25-69, with a high grade abnormal Pap test result.

	2013	2014	2015	2016
BC Total	**0.9**	**0.8**	**0.8**	**0.8**
Interior Health Authority	**0.9**	**0.8**	**0.8**	**0.8**
East Kootenay HSDA	1.3	1.1	1.2	1.0
Kootenay Boundary HSDA	1.1	1.0	1.0	1.1
Okanagan HSDA	1.1	0.9	0.9	0.9
Thompson Cariboo Shuswap HSDA	1.1	1.0	1.0	1.0
Fraser Health Authority	**0.9**	**0.8**	**0.8**	**0.8**
Fraser East HSDA	1.1	1.0	1.0	0.9
Fraser North HSDA	0.9	0.8	0.8	0.7
Fraser South HSDA	0.9	0.8	0.8	0.7
Vancouver Coastal Health Authority	**0.9**	**0.8**	**0.8**	**0.8**
Richmond HSDA	0.8	0.6	0.6	0.5
Vancouver HSDA	1.0	0.9	0.8	0.8
North Shore/Coast Garibaldi HSDA	0.9	0.8	0.8	0.7
Vancouver Island Health Authority	**0.9**	**0.8**	**0.8**	**0.8**
South Vancouver Island HSDA	1.0	0.9	0.9	0.8
Central Vancouver Island HSDA	1.1	1.0	0.9	0.9
North Vancouver Island HSDA	1.0	1.0	1.0	1.0
Northern Health Authority	**0.9**	**0.8**	**0.8**	**0.8**
Northwest HSDA	1.4	1.0	1.0	1.0
Northern Interior HSDA	1.1	1.1	1.1	1.1
Northeast HSDA	1.6	1.2	1.4	1.1

Table 13: Cervix Screening to Colposcopy Time Interval

Percentage of BC Cancer Cervix Screening participants, ages 25-69, with a high grade abnormal Pap test result, who received a colposcopy within six weeks after screening.

	2013	2014	2015	2016
BC Total	**24.6**	**32.6**	**40.9**	**49.2**
Interior Health Authority	**35.7**	**54.3**	**55.4**	**50.9**
East Kootenay HSDA	16.7	34.2	50.0	22.7
Kootenay Boundary HSDA	31.1	37.5	48.5	44.9
Okanagan HSDA	48.6	68.8	64.2	61.0
Thompson Cariboo Shuswap HSDA	19.4	45.5	44.7	46.9
Fraser Health Authority	**20.2**	**31.6**	**47.1**	**58.2**
Fraser East HSDA	19.1	65.4	67.0	71.6
Fraser North HSDA	22.5	26.6	33.3	55.4
Fraser South HSDA	18.3	25.2	53.7	57.2
Vancouver Coastal Health Authority	**24.2**	**23.2**	**29.1**	**46.1**
Richmond HSDA	15.6	14.9	16.3	37.8
Vancouver HSDA	22.4	23.8	30.5	50.8
North Shore/Coast Garibaldi HSDA	33.9	26.7	33.3	37.5
Vancouver Island Health Authority	**26.2**	**34.5**	**43.0**	**49.4**
South Vancouver Island HSDA	16.5	35.6	56.6	55.6
Central Vancouver Island HSDA	36.7	34.8	35.1	35.4
North Vancouver Island HSDA	31.1	28.8	24.7	60.9
Northern Health Authority	**15.1**	**18.6**	**14.4**	**18.3**
Northwest HSDA	29.8	16.7	13.9	18.6
Northern Interior HSDA	8.4	19.2	14.3	19.4
Northeast HSDA	0.0	20.0	20.0	0.0

Table 14: Pap Test Positive Predictive Value

Percentage of high grade abnormal Pap tests in BC Cancer Cervix Screening Program participants, ages 25-69, with histological work-up found to have a pre-cancerous lesion or an invasive cancer .

	2013	2014	2015	2016
BC Total	**50.2**	**53.6**	**54.3**	**56.3**
Interior Health Authority	**53.3**	**59.2**	**58.2**	**59.4**
East Kootenay HSDA	53.0	53.3	65.8	60.7
Kootenay Boundary HSDA	40.7	70.6	57.9	56.5
Okanagan HSDA	58.8	59.2	57.1	57.1
Thompson Cariboo Shuswap HSDA	48.6	57.3	56.3	64.1
Fraser Health Authority	**48.8**	**50.8**	**50.6**	**53.5**
Fraser East HSDA	51.2	60.9	52.0	55.6
Fraser North HSDA	48.7	46.7	51.0	54.7
Fraser South HSDA	48.0	50.7	49.6	51.7
Vancouver Coastal Health Authority	**51.5**	**55.4**	**54.0**	**54.5**
Richmond HSDA	40.7	51.1	49.5	53.2
Vancouver HSDA	52.2	55.6	54.1	56.7
North Shore/Coast Garibaldi HSDA	55.7	57.2	56.3	50.0
Vancouver Island Health Authority	**46.3**	**51.2**	**55.2**	**58.5**
South Vancouver Island HSDA	45.4	55.4	57.7	57.3
Central Vancouver Island HSDA	43.0	43.0	50.6	56.1
North Vancouver Island HSDA	56.8	56.3	57.1	66.7
Northern Health Authority	**55.4**	**50.7**	**60.2**	**60.6**
Northwest HSDA	49.1	37.8	51.2	60.4
Northern Interior HSDA	50.6	58.1	61.2	58.9
Northeast HSDA	74.4	48.6	68.6	70.6

Table 15: Cervix Pre-Cancer Detection Rate

Number of pre-cancerous lesions detected, per 1,000 screens in BC Cancer Cervix Screening Program participants, ages 25-69.

	2013	2014	2015	2016
BC Total	**5.6**	**5.6**	**5.6**	**6.0**
Interior Health Authority	**7.0**	**6.9**	**7.0**	**7.9**
East Kootenay HSDA	7.4	8.4	9.6	8.2
Kootenay Boundary HSDA	6.2	9.1	6.4	7.9
Okanagan HSDA	7.4	6.5	6.9	7.3
Thompson Cariboo Shuswap HSDA	6.4	6.0	6.5	8.9
Fraser Health Authority	**5.1**	**5.0**	**4.9**	**5.1**
Fraser East HSDA	6.1	6.8	5.9	5.8
Fraser North HSDA	5.0	4.5	4.8	5.3
Fraser South HSDA	4.9	4.9	4.7	4.6
Vancouver Coastal Health Authority	**5.4**	**5.6**	**5.1**	**5.6**
Richmond HSDA	3.6	4.4	3.7	3.7
Vancouver HSDA	5.8	6.2	5.5	6.3
North Shore/Coast Garibaldi HSDA	5.7	5.2	5.2	5.3
Vancouver Island Health Authority	**5.7**	**5.4**	**6.2**	**6.6**
South Vancouver Island HSDA	5.2	5.2	6.2	5.8
Central Vancouver Island HSDA	5.8	4.7	5.5	6.9
North Vancouver Island HSDA	7.1	7.3	7.4	8.5
Northern Health Authority	**6.6**	**6.2**	**6.6**	**6.7**
Northwest HSDA	6.8	5.0	6.4	7.1
Northern Interior HSDA	5.6	6.6	6.7	7.8
Northeast HSDA	8.5	6.7	6.8	3.5

Colon Screening Performance Summary

Table 16: Colon Screening Participation

Percentage of British Columbia screen-eligible population, ages 50-74, who completed a fecal immunochemical test (FIT) within a 30-month period with the BC Cancer Colon Screening Program. The BC Cancer Colon Screening Program started in November 2013.

	2014	2015	2016
B.C. Total	**13.2**	**26.0**	**33.6**
Interior Health Authority	**16.3**	**30.9**	**39.1**
East Kootenay HSDA	18.2	30.3	33.1
Kootenay Boundary HSDA	22.1	38.7	44.5
Okanagan HSDA	17.6	34.6	45.4
Thompson Cariboo Shuswap HSDA	11.3	22.2	29.0
Fraser Health Authority	**11.7**	**23.8**	**31.4**
Fraser East HSDA	11.4	23.2	30.8
Fraser North HSDA	13.2	26.1	34.1
Fraser South HSDA	10.5	22.1	29.4
Vancouver Coastal Health Authority	**12.8**	**25.2**	**32.5**
Richmond HSDA	14.5	26.6	32.8
Vancouver HSDA	13.5	25.8	32.5
North Shore/Coast Garibaldi HSDA	10.2	22.9	32.1
Vancouver Island Health Authority	**13.2**	**26.2**	**33.7**
South Vancouver Island HSDA	16.3	31.8	39.9
Central Vancouver Island HSDA	12.8	24.7	31.9
North Vancouver Island HSDA	6.0	14.4	20.9
Northern Health Authority	**No Data**	**No Data**	**No Data**

Table 17: Colon Screening Retention

Percentage of BC Cancer Colon Screening Program participants, ages 50-72, who returned for a subsequent FIT within 30 months of a negative FIT.

	2014	2015	2016
B.C. Total	**59.5**	**N/A**	**N/A**
Interior Health Authority	**61.7**	**N/A**	**N/A**
East Kootenay HSDA	53.9	N/A	N/A
Kootenay Boundary HSDA	62.4	N/A	N/A
Okanagan HSDA	66.4	N/A	N/A
Thompson Cariboo Shuswap HSDA	54.6	N/A	N/A
Fraser Health Authority	**57.8**	**N/A**	**N/A**
Fraser East HSDA	54.6	N/A	N/A
Fraser North HSDA	59.9	N/A	N/A
Fraser South HSDA	56.9	N/A	N/A
Vancouver Coastal Health Authority	**59.4**	**N/A**	**N/A**
Richmond HSDA	60.8	N/A	N/A
Vancouver HSDA	58.2	N/A	N/A
North Shore/Coast Garibaldi HSDA	61.1	N/A	N/A
Vancouver Island Health Authority	**59.7**	**N/A**	**N/A**
South Vancouver Island HSDA	61.1	N/A	N/A
Central Vancouver Island HSDA	58.7	N/A	N/A
North Vancouver Island HSDA	54.4	N/A	N/A
Northern Health Authority	**No Data**	**No Data**	**No Data**

Table 18: Colon Screening Abnormal FIT Rate

Percentage of BC Cancer Colon Screening participants, ages 50-74, that had an abnormal FIT result and were referred for further testing.

	2014	2015	2016
B.C. Total	**13.7**	**14.0**	**13.5**
Interior Health Authority	**15.3**	**15.2**	**15.0**
East Kootenay HSDA	15.4	16.7	15.2
Kootenay Boundary HSDA	13.9	14.7	15.6
Okanagan HSDA	14.8	14.6	14.0
Thompson Cariboo Shuswap HSDA	17.3	16.4	17.3
Fraser Health Authority	**13.0**	**13.1**	**12.8**
Fraser East HSDA	15.2	15.8	14.3
Fraser North HSDA	12.5	12.7	12.3
Fraser South HSDA	12.6	12.6	12.6
Vancouver Coastal Health Authority	**12.2**	**12.4**	**12.8**
Richmond HSDA	11.3	11.6	12.3
Vancouver HSDA	12.3	12.2	12.6
North Shore/Coast Garibaldi HSDA	13.2	13.3	13.8
Vancouver Island Health Authority	**13.6**	**14.5**	**14.0**
South Vancouver Island HSDA	12.8	14.1	13.2
Central Vancouver Island HSDA	14.4	14.8	15.1
North Vancouver Island HSDA	15.6	16.0	14.0
Northern Health Authority	**No Data**	**No Data**	**No Data**

Table 19: Colon Screening Colonoscopy Wait Times

Percent of BC Cancer Colon Screening Program participants, ages 50-74, with an abnormal FIT result who received a colonoscopy within 60 days after screening.

	2014	2015	2016
B.C. Total	**14.7**	**38.4**	**41.6**
Interior Health Authority	**10.4**	**27.7**	**17.5**
East Kootenay HSDA	17.3	19.4	9.4
Kootenay Boundary HSDA	0.9	0.5	3.3
Okanagan HSDA	3.8	22.7	19.9
Thompson Cariboo Shuswap HSDA	31.2	53.1	19.6
Fraser Health Authority	**15.8**	**42.4**	**45.8**
Fraser East HSDA	0.8	51.3	74.2
Fraser North HSDA	13.6	21.8	13.5
Fraser South HSDA	24.1	56.8	52.2
Vancouver Coastal Health Authority	**15.7**	**18.4**	**54.2**
Richmond HSDA	14.3	19.9	62.4
Vancouver HSDA	15.0	17.1	50.2
North Shore/Coast Garibaldi HSDA	20.2	20.6	55.5
Vancouver Island Health Authority	**12.4**	**56.2**	**47.7**
South Vancouver Island HSDA	17.0	80.1	73.2
Central Vancouver Island HSDA	6.0	28.1	19.0
North Vancouver Island HSDA	14.5	46.2	26.3
Northern Health Authority	**No Data**	**No Data**	**No Data**

Table 20: FIT Positive Predictive Value

Percentage of BC Cancer Colon Screening participants, ages 50-74 that had an abnormal FIT result and colonoscopy and were diagnosed with pre-cancerous polyp(s).

	2014	2015	2016
B.C. Total	**52.5**	**53.1**	**53.8**
Interior Health Authority	**54.8**	**55.9**	**55.6**
East Kootenay HSDA	58.3	58.1	55.8
Kootenay Boundary HSDA	54.4	61.0	55.7
Okanagan HSDA	55.1	56.1	56.6
Thompson Cariboo Shuswap HSDA	52.9	52.7	53.1
Fraser Health Authority	**49.4**	**51.1**	**52.4**
Fraser East HSDA	45.1	46.5	48.4
Fraser North HSDA	51.0	52.1	55.8
Fraser South HSDA	50.3	52.4	52.2
Vancouver Coastal Health Authority	**50.7**	**50.8**	**50.9**
Richmond HSDA	49.4	52.1	52.5
Vancouver HSDA	51.5	51.7	53.1
North Shore/Coast Garibaldi HSDA	49.5	47.3	45.2
Vancouver Island Health Authority	**55.3**	**55.1**	**56.5**
South Vancouver Island HSDA	56.6	56.0	60.0
Central Vancouver Island HSDA	53.3	54.5	53.9
North Vancouver Island HSDA	55.1	53.3	49.7
Northern Health Authority	**No Data**	**No Data**	**No Data**

Table 21: Colon Screening Cancer Detection Rate

Number of cancers detected per 1,000 FITs in BC Cancer Colon Screening Program participants, ages 50-74.

	2014	2015	2016
B.C. Total	**3.0**	**2.8**	**2.4**
Interior Health Authority	**3.1**	**2.5**	**2.5**
East Kootenay HSDA	2.1	2.3	2.2
Kootenay Boundary HSDA	2.9	1.4	2.0
Okanagan HSDA	3.4	2.3	2.6
Thompson Cariboo Shuswap HSDA	3.3	4.0	2.7
Fraser Health Authority	**3.0**	**2.9**	**2.2**
Fraser East HSDA	4.7	4.0	2.3
Fraser North HSDA	3.1	2.7	2.0
Fraser South HSDA	2.2	2.6	2.3
Vancouver Coastal Health Authority	**2.3**	**1.9**	**2.3**
Richmond HSDA	2.9	1.8	2.4
Vancouver HSDA	2.4	2.0	2.2
North Shore/Coast Garibaldi HSDA	1.6	1.7	2.3
Vancouver Island Health Authority	**3.8**	**3.9**	**3.0**
South Vancouver Island HSDA	3.7	3.7	2.8
Central Vancouver Island HSDA	3.8	4.5	3.3
North Vancouver Island HSDA	3.9	3.3	2.8
Northern Health Authority	**No Data**	**No Data**	**No Data**

Special Focus: Diagnostic Wait Times

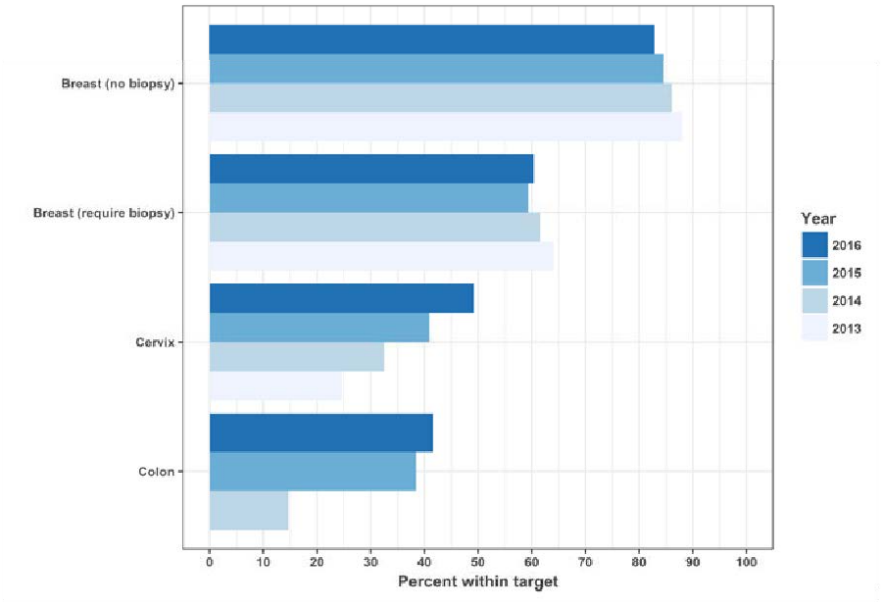
Screening tests identify a smaller group of asymptomatic patients for further investigation to determine whether they have cancer or pre-cancerous lesions so that treatment can be initiated. An abnormal screening result does not mean a cancer is found, but does indicate that additional procedures are recommended. Timely resolution of an abnormal screening result reduces unnecessary anxiety, frustration and stress for patients and their families. Long delays to diagnosis do not allow treatment to be initiated in a timely manner, which may lead to more complex treatment and poorer outcomes. Delays may also have negative impact on screening retention when no cancer or pre-cancerous lesions are found. Avoiding or delaying screening in the future can lead to cancer being diagnosed in later stages.

Table 22: Screening Program Wait Time Targets

Diagnostic Wait Time Targets
Breast Screening to Diagnosis within seven weeks for diagnosis requiring a tissue biopsy. Breast Screening to Diagnosis within five weeks for diagnosis not requiring a biopsy.
Cervix Screening High Grade Abnormal Result to Colposcopy within six weeks.
Colon Screening with Fecal Immunochemical Test (FIT) to Colonoscopy within 60 days.

Table 22 shows the diagnostic wait time targets established by the Pan-Canadian Cancer Screening Network for Breast, Cervix and Colon hosted by the Canadian Partnership Against Cancer. Figure 5 shows the proportion of Screening Program participants with abnormal screening results that met the wait time targets over time. The proportion meeting Colon diagnostic wait time target has improved but remains a priority for all health authorities. The proportion meeting Cervix diagnostic wait time target has steadily increased from 2013 to 2016, while the proportions meeting Breast wait time targets have declined slightly.

Figure 5: Proportion Meeting Diagnostic Wait Time Targets by Screening Program



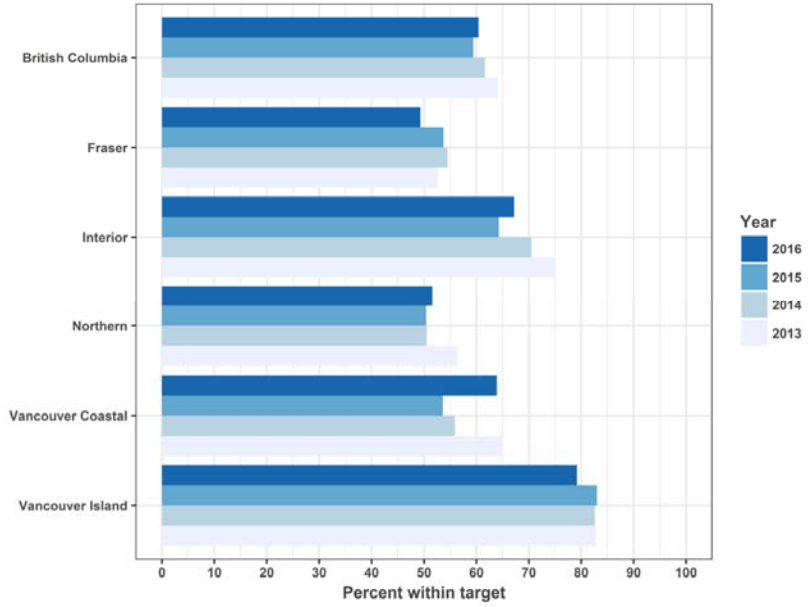
The process to resolve an abnormal screening result can involve multiple healthcare providers and tests. Examination of variations in diagnostic wait times across the province can help identify improvement opportunities. Variations in diagnosis wait times can be an indication of differences in the assessment practices (what tests and order of testing), care coordination (patient movement and hand-off throughout the process), or service capacity (availability of diagnostic tests). Regional differences in wait times can help initiate discussions to understand how different parts of the diagnostic healthcare system are working and where efforts can be focused to reduce the diagnostic wait times.

Breast Screening

All women participating in the BC Cancer Breast Screening Program are referred directly to a diagnostic imaging clinic after the abnormal screening result (called “Fast Track”). This facilitated referral process was implemented in 1999 to improve the care coordination into the diagnostic system to initiate the imaging work-up.

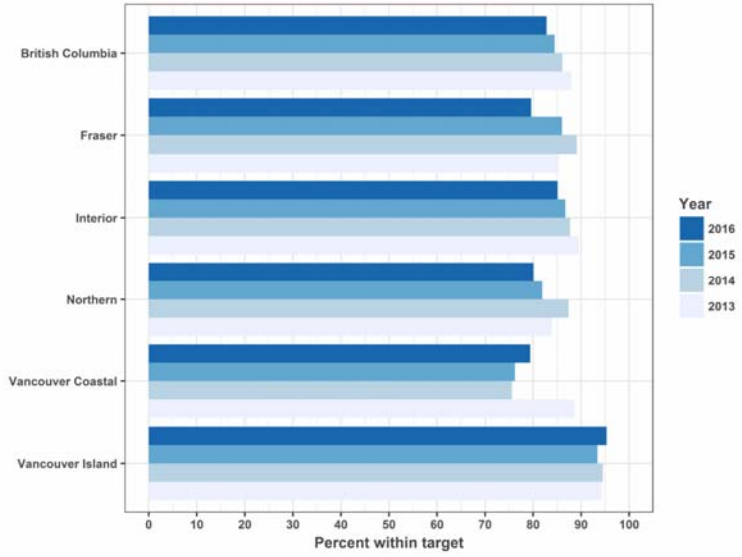
Approximately 18% of individuals with an abnormal screening mammogram in the program require a tissue biopsy for their diagnosis. Figure 6 shows the percentage within the diagnostic wait time target of 7 weeks from 2013 to 2016 by Regional Health Authorities. The overall B.C. percentage within target has declined slightly from 64% in 2013 to 60% in 2016. Island Health has the highest percentage within target year over year, but has dropped just below 80% in 2016. Fraser Health and Northern Health have struggled to break through 55%. Vancouver Coastal Health has made the best single year improvement from 54% in 2015 to 64% in 2016.

Figure 6: Breast Screening to Diagnosis within 7 Weeks for Diagnosis Requiring a Tissue Biopsy



Approximately 82% of individuals with an abnormal screening mammogram in BC Cancer Breast Screening Program do not require a biopsy after further imaging studies. Figure 7 shows the percentage within the diagnostic wait time target of 5 weeks from 2013 to 2016 by Regional Health Authorities. The overall B.C. percentage within target has declined from 88% in 2013 to 83% in 2016. There is less regional variation for diagnostic wait time not requiring biopsy. Island Health had the highest percentage within target at 95%, while Vancouver Coastal had the lowest at 79% in 2016.

Figure 7: Breast Screening to Diagnosis within 5 Weeks for Diagnosis Not Requiring a Tissue Biopsy



The cause of the wait time variations across the province is not clear. One key area that is impacting wait times is breast ultrasound capacity. There is a general shortage of qualified breast ultrasound technologists resulting in limited numbers of examinations available daily. Wait times may also be affected by the need to coordinate care along the clinical pathway, including referrals for image -guided biopsies.

Cervix Screening

Patients with a high grade abnormal Pap test result are recommended to have colposcopy follow-up. The percentage of patients with colposcopy wait time meeting the target of 6 weeks following their abnormal Pap test has steadily improved from 25% in 2013 to 49% in 2016. Fraser Health has the highest percentage within target at 58%, while Northern Health has the lowest at 18% in 2016. Vancouver Coastal Health has made the best single year improvement from 29% in 2015 to 46% in 2016.

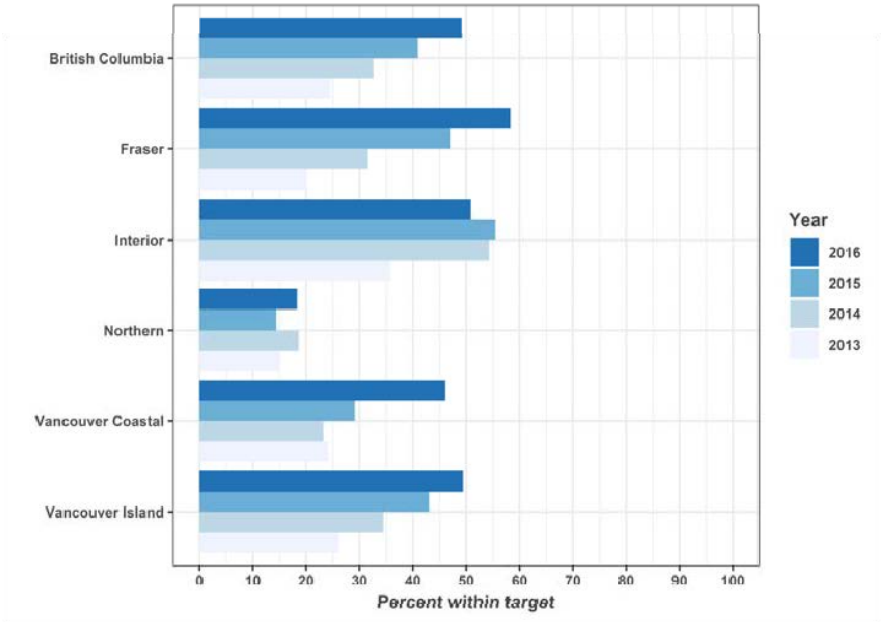
The BC Cancer Cervix Screening Program does not have data on when patients are referred for colposcopy and whether longer wait times are due to delays in referral or colposcopy clinic or patient related factors. Colposcopy volume has been declining in B.C. over the 2013 to 2016 timeframe which may explain the improvement in wait time for patients. Some smaller centres offer colposcopy clinics infrequently and therefore wait times in those areas may be dependent on when a referral is received and when the next clinic is being offered.

Colposcopy clinics are encouraged to prioritize procedure booking based on patient's cervix screening result at referral. High grade abnormal Pap test result may fall into "high" or "moderate" priority for procedure booking. The wait time indicator provides an overview of wait time experience for both groups of high grade abnormalities combined.

Booking Priority	Referral Cervix Screening Result	Target
High	HSIL-severe, AIS, cancer	Within 4 weeks
Moderate	AGC, ASC-H, HSIL-moderate	Within 8 weeks
Low	Persistent ASC-US, LSIL	Within 12 weeks

Education for colposcopy clinics regarding wait time targets and supporting colposcopy booking based on referral cervix screening result is ongoing. In addition, plans are underway to implement a facilitated referral process for patients who are recommended to have colposcopy follow-up as a way to reduce referral delays.

Figure 8: Cervix Screening High Grade Abnormal Result to Colposcopy within 6 weeks



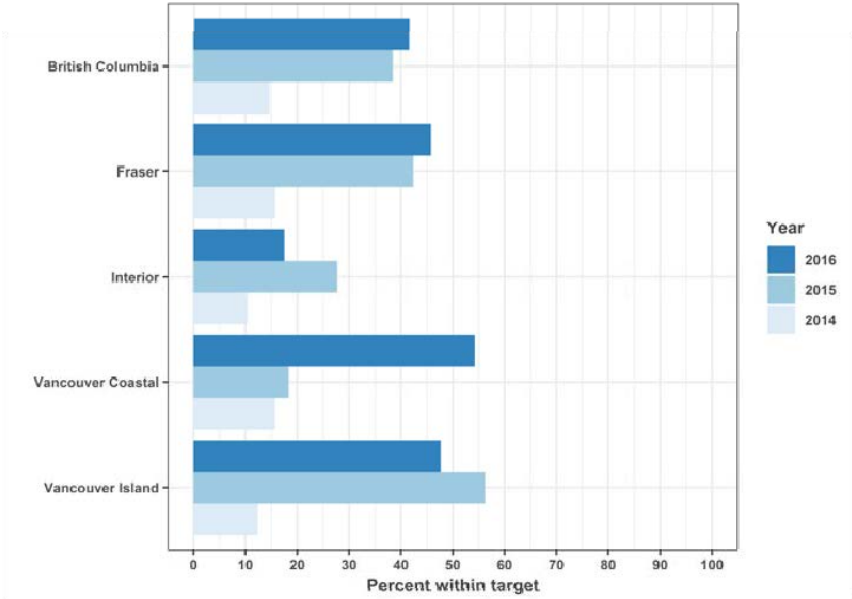
Colon Screening

The BC Cancer Colon Screening Program process forwards abnormal FIT results to regional health authority centres for colonoscopy assessment. After initial assessment by the patient coordinator, patients proceeding to colonoscopy are booked for the procedure. Since the BC Colon Screening Program started in November 2013, the first full year of reporting is 2014. Northern Health primary care providers have decided to manage colonoscopy referrals on their own, and do not provide data to BC Cancer. Thus, there are no data available from Northern Health for comparison.

Based on data collected by the BC Cancer Colon Screening Program, the percentage of patients with colonoscopy within 60 days after the abnormal FIT has steadily improved, from 15% in 2014 to 42% in 2016. Vancouver Coastal Health has the highest percentage within target at 54%, while Interior Health has the lowest at 18% in 2016. Vancouver Coastal Health has made the best single year improvement from 18% in 2015 to 54% in 2016.

It is recognized that there are many clinical indications for colonoscopy services aside from an abnormal FIT result. Appropriate case prioritization is important to minimize negative impact on patient outcomes. Thus, a system view is required to make improvement on the colonoscopy wait time.

Figure 9: Colon Screening with Fecal Immunochemical Test (FIT) to Colonoscopy within 60 Days



Future Directions

BC Cancer is continuously monitoring new developments in cancer screening in order to provide the best care for British Columbians. In addition, researchers here in British Columbia are at the forefront of research in new modalities for cancer screening. A key example is the recent study conducted in conjunction with the BC Cancer Cervix Screening Program which showed that replacing the current Pap test with primary Human Papillomavirus (HPV) screening identifies women at risk of cervical cancer earlier; and women who are HPV negative can have less frequent screening.[2] Some new developments are outlined below.

HPV Testing for Cervical Cancer

The research study quoted above, along with other research, clearly points to the need for British Columbia to transition from Pap tests to HPV testing as primary screening for cervical cancer in women between age 30 and 69. Women between ages 25 and 29 should continue to be screened using Pap tests, as HPV is very common but often clears on its own in this age group. Besides the benefit of the higher sensitivity (ability to detect cancer) of the test, the HPV test is extremely cost-effective as it lengthens the required interval between tests from three to five years. The benefit of the HPV test in cervical cancer screening has been confirmed in a review and been recommended for adoption by the British Columbia Lifetime Prevention Schedule Committee. Another potential longer-term benefit is that the HPV test could allow self-collection of cervical cells, thereby increasing the ability of women in rural and remote areas, as well as women without access to a healthcare provider, to be screened. We expect HPV screening will be offered to eligible women in British Columbia in the next few years.

High-Risk Lung Cancer Screening

There is strong and growing evidence that lung cancer screening using low-dose computed tomography (LDCT) scans can reduce mortality in men and women who are at high risk of lung cancer[3,4]. The use of LDCT in high risk lung cancer screening has been reviewed and recommended by the British Columbia Lifetime Prevention Schedule Committee, and the Canadian Task Force on Preventive Health Care. This has also been identified as an area of high priority for BC Cancer.

Improve Participation in Existing Screening Programs

There are four key areas that BC Cancer Screening requires partnership with Primary Care Networks and Patient Medical Homes, Regional and First Nations Health Authorities and the Ministry of Health to address.

1. **Invitation Letters for Newly Eligible Individuals**
   Unlike most other provincial screening programs, British Columbia currently does not contact men and women when they become eligible for one or more of the screening programs. Because of this, many British Columbians are not even aware that they are eligible to participate in a program that can reduce their risk of dying from cancer. BC Cancer Screening is working with the Ministry of Health to use personal contact information to send invitations to newly eligible British Columbians. The personal invite will include information about potential benefits and limitations of specific cancer screening to help the individual make informed decision about cancer screening.

2. **Screening for Individuals without Primary Care Provider**
   Primary care providers play a key role in cancer screening. A primary care provider helps the patient consider evidence-based information to make an informed decision about screening, and has the overall responsibility for coordinating management of patients with abnormal screening results. BC Cancer Screening Program supports primary care providers by developing tools for communication with patients, and by implementing a standard pathway to facilitate referral for patients with abnormal screening results to diagnostic investigation. The current cancer screening access model limits participation of individuals with no primary care provider. This is a key area of interest for BC Cancer Screening to work with Primary Care Networks and Patient Medical Homes to address.

3. **Screening Access for Remote or Rural Populations**
   The BC Cancer Breast Screening Program has partnered with Regional Health Authorities and Community Imaging Clinics to provide screening mammography services with 36 fixed location clinics, and three mobile units with onboard state-of-art equipment which serve over 170 rural communities. Cervix screening involves a healthcare provider to collect a small sample of cells from the patient's cervix for laboratory analysis. The lack of access to primary care provider or alternate

healthcare provider to collect the cervical sample is a barrier for screening participation in various remote and rural populations. Colon screening requires patients to pick up a fecal immunochemical test (FIT) kit from a laboratory and then return to the laboratory to drop off a completed kit. The distance to a laboratory can be a challenge for individuals living in remote or rural locations. BC Cancer Screening is keen to partner with Primary Care Networks, Patient Medical Homes, Regional and First Nations Health Authority to develop alternate approaches to improve screening participation in rural and remote populations.

4. **Screening in Indigenous Populations**
   A partnership between BC Cancer and First Nations Health Authority, Métis Nation British Columbia and the BC Association of Aboriginal Friendship Centres has resulted in a strategy to address the unique cancer-related challenges facing Indigenous communities in British Columbia.[5] One of the main goals of this strategy is to prevent and detect cancer earlier by participating in culturally safe colon, cervical and breast cancer screening programs. BC Cancer is working with the First Nations Health Authority to develop initiatives to increase cancer screening participation in Indigenous populations.

Continuously monitor ongoing research into new innovations in cancer screening

New strategies to improve cancer screening are continuously being examined. For example, new imaging modalities to screen for breast cancer, and screening guidelines that personalize recommendations based on an individual's estimated cancer risk. Each new screening approach is evaluated to understand its impact on detection of cancer or pre-cancer conditions and how earlier detection may impact cancer mortality and incidence. Screening strategies that reduce the number of false-positive screening tests, or reduce the frequency of screening can have a tremendous financial benefit to the health care system, and to also improve patient experience (e.g. reduce wait time for procedures and avoid anxiety of going through tests). An exciting new development is the development of blood tests that detect circulating tumour DNA, and potentially can detect many types of asymptomatic cancers. These tests, although still many years away from implementation, have the potential to pre-select a smaller number of individuals for specific cancer screening, to improve detection of cancers that we currently screen for, and to detect tumours which are rapidly fatal and for which no current method of early detection is available (such as cancers of the liver, pancreas and ovary).

References

2. Ogilvie GS, van Niekerk D, Krajden M, et al. Effect of screening with primary cervical HPV testing vs cytology testing on high-grade cervical intraepithelial neoplasia at 48 months: the HPV FOCAL randomized clinical trial. JAMA. 2018;320(1):43-52. doi:10.1001/jama.2018.7464

3. De Koning H, Van Der Aalst C, Ten Haaf K, et al: Effects of volume CT lung cancer screening: Mortality results of the NELSON randomized-controlled population based trial. 2018 World Conference on Lung Cancer. Abstract PL02.05. Presented September 25, 2018.

4. National Lung Screening Trial Research Team, Aberle DR, Adams AM, Berg CD, et al: Reduced lung-cancer screening mortality with low-dose computed tomographic screening. N Engl J Med 365:395-409, 2011.

5. Improving Indigenous Cancer Journeys in BC: A Road Map (2017). www.fnha.ca.

Appendix 1: List of Terminology and Abbreviations

AGC: atypical glandular cells

AIS: adenocarcinoma in situ

ASC-H: atypical squamous cells - cannot exclude high grade squamous intraepithelial lesion

ASC-US: atypical squamous cells of undetermined significance

CIN: cervical squamous intraepithelial neoplasia

DCIS: ductal carcinoma in-situ

FIT: fecal immunochemical test

Higher than average risk for breast screening: have first degree relative (mother, sister, daughter) with breast cancer

Higher than average risk for colon screening: have one first degree relative (mother, father, sister, brother, daughter or son) with colon cancer diagnosed under the age of 60, or two or more first degree relatives with colon cancer diagnosed at any age; or have a personal history of adenomas

High Grade Abnormal Pap Test Results: AGC, ASC-H, HSIL, AIS and cancer.

HSIL: high-grade squamous intraepithelial lesion, including moderate or severe findings

IBD: Inflammatory bowel disease

Low Grade Abnormal Pap Test Results: ASC-US and LSIL.

LSIL: low-grade squamous intraepithelial lesion

Pap: Papanicolaou test

Pre-Cancerous Cervical Lesions: CIN 2, CIN 3

Pre-cancerous polyps (or adenomas): Low risk polyp, Multiple Low Risk Polys, High risk polyp

Appendix 2: Indicator Definitions

Indicator	Data Specifications	Calculation Description
Breast Screening Participation Rate Percentage of British Columbia screen-eligible women, ages 50-74, who had a screening mammogram within a 30-month period with the BC Cancer Breast Screening Program.	**Data Sources:** • Breast Screening Program application – Breast Screening Mammograms • PEOPLE2017 BC STATS – BC Population Data • BC Cancer Registry (BCCR) – invasive breast cancers **Calculation:** $\frac{\text{Eligible Participants}}{\text{Eligible Target Population}} \times 100\% =$ Breast Screening Participation Rate	**Denominator:** Number of women in BC, in specified age range calculated using BC STATS population estimates. Population estimates are linearly interpolated to obtain the estimated population at the end of the time period of interest. **Exclusions:** • Adjustments are made for women with a prior diagnosis of breast cancers. • Patients with missing HA data are excluded from HA specific calculations but included in overall BC calculations if they are still identified as BC residents. **Numerator:** Number of unique women in BC, who are in specified age range at the end of the reporting period date, who have had at least one mammography screening test within the 30-month period.
Breast Screening Retention Rate Percentage of BC Cancer Breast Screening Program participants, ages 50-72, who returned for screening mammogram within 30 months.	**Data Sources:** • Breast Screening Program application – Breast Screening Mammograms **Calculation:** $\frac{\text{Participants who returned for a subsequent screen within 30 months of previous screen}}{\text{Eligible Target Population}} \times 100\% =$ Breast Screening Retention Rate	**Denominator:** Number of unique screen-eligible women in BC, ages 50-72 at the time of their initial screen within the period. **Exclusions:** Patients with missing HA data are excluded from HA specific calculations but included in overall BC calculations if they are still identified as BC residents **Numerator:** Number of unique women in BC, ages 50-72 at the time of their initial screen within the period, who returned for a subsequent screening mammogram within 30 months of index screen. Target population for the screening program is 50-74 but with a 24 month recommended screening interval, including women who will be outside the age range at that point of return will underestimate the retention rates. In cases of multiple screens per woman the first screen is used as the index screen. **Competing risk survival analysis method:** This calculation is performed using the Fine & Grey competing risk survival analysis method in which the women whose index screens are in the period are the cohort. Time to next screen is the next screen for a woman after her index screen. Women who have not returned by the end of the follow-up period are censored. Women who have had a cancer diagnosis are treated as a competing event. The cumulative incidence function is calculated and therefore, the proportion of women who have returned at any point along that function can be identified.

Indicator	Data Specifications	Calculation Description
Breast Screening Abnormal Call Rate Percentage of BC Cancer Breast Screening Program mammography participants, ages 50-74, that are identified as abnormal and referred for further testing.	**Data Sources:** • Breast Screening Program application – Breast Screening Mammograms and Results **Calculation:** $\frac{\text{Number of abnormal screens}}{\text{Number of total screens}} \times 100\% =$ Breast Screening Abnormal Call Rate	**Denominator:** Number of total screens within period of interest. **Numerator:** Number of abnormal screens within period of interest. Patient's age is calculated as age at index abnormal screen.
Breast Screening to Diagnosis (with Tissue Biopsy) Percentage of BC Cancer Breast Screening Program participants, ages 50–74, with an abnormal screening mammogram result completed diagnostic work-up within 7 weeks after screening, when a tissue biopsy is required.	**Data Sources:** • Breast Screening Program application – Breast Screening Mammograms and Results **Calculation:** $\frac{\text{Number of definitive diagnoses within 7 weeks of abnormal screen date}}{\text{Total number of abnormal screens that needed a tissue biopsy}} \times 100\% =$ Diagnostic Interval Rate	**Denominator:** Total number of abnormal screens requiring tissue biopsy in period of interest. **Exclusions:** • Pure fine needle aspiration (FNA) tissue procedures are excluded (core FNA procedures are included along with core biopsies). • Cases lost to follow-up or with missing date or diagnostic assessment information are excluded from the numerator and denominator. **Numerator:** Number of definitive diagnoses within target time-range (7 weeks). • Time from abnormal screen to definitive diagnosis = date of definitive diagnosis – screen date • The date of definitive diagnosis for cancer is the date of the first core or open biopsy that diagnoses cancer (DCIS or invasive). The date of definitive diagnosis for benign cases is the date of the last benign biopsy or procedure, or the last test prior to a recommendation to return to regular screening. • Patient's age is calculated as age at index abnormal screen.
Breast Screening to Diagnosis (without Tissue Biopsy) Percentage of BC Cancer Breast Screening Program participants, ages 50–74, with an abnormal screening mammogram result completed diagnostic work-up within 5 weeks after screening, when no tissue biopsy is required.	**Data Sources:** • Breast Screening Program application – Breast Screening Mammograms and Results **Calculation:** $\frac{\text{Number of definitive diagnoses within 5 weeks of abnormal screen date}}{\text{Total number of abnormal screens that do not need a tissue biopsy}} \times 100\% =$ Diagnostic Interval Rate	**Denominator:** Total number of abnormal screens requiring tissue biopsy in period of interest. **Exclusions:** • Cases lost to follow-up or with missing date or diagnostic assessment information are excluded from the numerator and denominator. **Numerator:** Number of definitive diagnoses within target time-range (5 weeks). • Time from abnormal screen to definitive diagnosis = date of definitive diagnosis – screen date • The date of definitive diagnosis for benign cases is the date of the last benign procedure within 3 months of the abnormal screen, or the last test prior to a recommendation to return to regular screening. • Patient's age is calculated as age at index abnormal screen.

Indicator	Data Specifications	Calculation Description
Mammography Positive Predictive Value Percentage of abnormal mammograms in BC Cancer Breast Screening Program participants, ages 50–74, diagnosed with breast cancer (invasive or ductal carcinoma in situ) after diagnostic work-up.	**Data Sources:** • Breast Screening Program application – Breast Screening Mammograms and Results **Calculation:** $\frac{\text{Number of screen-detected cancers (DCIS or invasive)}}{\text{Number of abnormal screens}} \times 100\% =$ Positive Predictive Value	**Denominator:** Number of abnormal screens in period of interest. **Exclusions:** • Cases lost to follow-up are excluded from the numerator and denominator. **Numerator:** Number of screen-detected cancers (DCIS or invasive) within period of interest. • Patient's age is calculated as age at index abnormal screen • Most severe result per screen is used
Breast Screening Invasive Cancer Detection Rate Number of invasive breast cancers detected per 1,000 screening mammograms in BC Cancer Breast Screening Program participants, ages 50-74.	**Data Sources:** • Breast Screening Program application – Breast Screening Mammograms and Results **Calculation:** $\frac{\text{Number of invasive cancers detected}}{\text{Total number of screens}} \times 1000 =$ Invasive Detection Rate	**Denominator:** Total number of screening mammograms within period of interest. **Exclusions:** • Cases lost to follow-up are excluded from the numerator and denominator. **Numerator:** Number of invasive cancers detected within period of interest. • Patient's age is calculated as age at index abnormal screen
Cervix Screening Participation Rate Percentage of British Columbia screen-eligible women, ages 25-69, who completed a Pap test within a 42-month period with the BC Cancer Cervix Screening Program.	**Data Sources:** • Cytology Information System – Pap tests • PEOPLE2017 BC STATS – BC Population Data • Canadian Community Health Survey (CCHS) (2008, 2012) - Hysterectomy Rate estimates • MOH participant residence LHA dataset – Patient demographics **Calculation:** $\frac{\text{Eligible participants}}{\text{Eligible target population}} \times 100\% =$ Cervix Screening Participation Rate	**Denominator:** Number of women in BC, age 25-69, calculated using BC STATS population estimates. Population estimates are linearly interpolated to obtain the estimated population at the end of the time period of interest. **Exclusions:** • Adjustments are made for women with a hysterectomy • Patients with missing HA data are excluded from HA specific calculations but included in overall BC calculations if they are still identified as BC residents **Numerator:** Number of unique women in BC, who are aged 25-69 at the end of the reporting period date, who have had at least one cervical screening test within the previous 42 month period.

Indicator	Data Specifications	Calculation Description
Cervix Screening Retention Rate Percentage of BC Cancer Cervix Screening Program participants, ages 25-66, who returned for a subsequent pap test within 42-months of a normal Pap test result.	**Data Sources:** • Cytology Information System – Pap Smears **Calculation:** $\frac{\text{Participants with negative screen who return within 42 months}}{\text{All participants with negative screen}} \times 100\% =$ Cervix Retention Participation Rate	**Denominator:** Number of unique women in BC, who are aged 25-66 at the time of their most recent negative screen in the period, who also returned for screening within 42 months of index screen. **Exclusions:** • Women younger than 25 or older than 66 at time of index screen • Atypical screens • Any screen that is not cervical or endocervical • Unsatisfactory smears **Numerator:** Number of unique women in BC, who are aged 25-66 at the time of their most recent negative screen in the period. • Target population for the screening program is 25-69 but with a 36 month recommended interval, including women who will be outside the age range will underestimate retention rates • If multiple negative screens in a period, index screen is the most recent one. **Survival analysis cohort method:** This calculation is performed using the survival analysis cohort method in which the women whose index screens are in the period are the cohort. The period + 3 years of data are considered to give a maximum of 48 months follow-up and a minimum of 36 months follow-up for each woman. Time to next screen is the next screen for a woman after her index screen. Women who have not returned by the end of this follow-up are censored. The survival function is calculated and therefore, the proportion of women who have returned at any point along that function can be identified (up to 48 months).
Cervix Screening Abnormal Call Rate Percentage of BC Cancer Cervix Screening Program participants, ages 25-69, with an abnormal Pap test result . Atypical screens are categorized into either: 1. ASCUS/LSIL 2. Atypical glandular cells (AGC), atypical squamous cells - cannot exclude high grade squamous intraepithelial lesion (ASC-H), high-grade squamous intraepithelial lesions (HSIL), adenocarcinoma in situ (AIS) or invasive carcinoma	**Data Sources:** • Cytology Information System – Pap Smears and Results **Calculation:** $\frac{\text{Total number of women with an atypical screen}}{\text{Total number of women screened}} \times 100\% =$ Abnormal Call Rate	**Denominator:** Number of women in BC, with at least one satisfactory smear in period. • Patient's age is age at screen. • index screen is the worst screen for each woman in period **Exclusions:** • Any screen that is not cervical or endocervical • Unsatisfactory smears **Numerator:** Number of women in BC with an atypical screen in a period. **Catogories for reporting:** • Low Risk Abnormality – ASCUS or LSIL • High Risk Abnormality - Atypical glandular cells (AGC), atypical squamous cells - cannot exclude high grade squamous intraepithelial lesion (ASC-H), high-grade squamous intraepithelial lesions (HSIL), adenocarcinoma in situ (AIS) or invasive carcinoma

Indicator	Data Specifications	Calculation Description
Cervix Cancer Screening to Colposcopy Time Interval Percentage of BC Cancer Cervix Screening participants, ages 25-69, with a high-risk abnormal Pap test result, who received a colposcopy within 6 weeks after screening. Abnormal Pap results include: atypical glandular cells (AGC), atypical squamous cells - cannot exclude high grade squamous intraepithelial lesion (ASC-H), high-grade squamous intraepithelial lesions (HSIL), adenocarcinoma in situ (AIS) and invasive carcinoma.	**Data Sources:** • Cytology Information System – Pap Tests and Colposcopies **Calculation:** (Participants with a high-risk abnormal Pap Test with a Colposcopy within 6 weeks) / (All Participants with a high-risk abnormal Pap Test) x 100% = Percent within Target Interval	**Denominator:** Number of unique women in BC, who are aged 25-69 at the time of their most severe abnormal, high-risk screen in the period. **Exclusions:** • Women younger than 25 or older than 69 at time of index screen • Negative and moderate risk screens • Any screen that is not cervical or endocervical • Unsatisfactory smears **Numerator:** Number of unique women in BC, who are aged 25-69 at the time of their most severe abnormal, high-risk screen in the period who had a colposcopy within 6 weeks of this screen.
Pap Test Positive Predictive Value for High Risk Abnormality Percentage of abnormal Pap tests in BC Cancer Cervix Screening Program participants, ages 25-69, diagnosed with cervical squamous intraepithelial neoplasia (CIN) of grade 2/3 or more severe lesion. Abnormal Pap results include: atypical glandular cells (AGC), atypical squamous cells - cannot exclude high grade squamous intraepithelial lesion (ASC-H), high-grade squamous intraepithelial lesions (HSIL), adenocarcinoma in situ (AIS) and invasive carcinoma.	**Data Sources:** • Cytology Information System – Pap Tests and Colposcopies **Calculation:** (Number of atypical screens with an atypical pathology result of CIN2 or higher) / (Number of atypical screens with a pathology result) x 100% = Positive Predictive Value	**Denominator:** Number of atypical screens in a period **Exclusions:** • Any screen that is not cervical or endocervical • Unsatisfactory/rejected/limited for interpretation smears • Atypical screens with no pathology result within 1 year **Numerator:** Number of atypical screens in a period with a pathology result within 1 year of index screen. • Patients age is age at screen • Most severe result per screen • Most severe pathology finding within 1 year of index screen
Cervix Pre-Cancer Detection Rate Number of pre-cancers detected, per 1,000 screens in BC Cancer Cervix Screening Program participants, ages 25-69.	**Data Sources:** • Cytology Information System – Pap Tests and Colposcopies **Calculation:** (Total number of women with a histological result of CIN2 or 3) / (Total number of women screened) x 1000 = Pre-Cancer Detection Rate	**Denominator:** Number of women in BC, with at least one satisfactory smear in period. • Patient's age is age at screen. • Index screen is the worst screen for each woman in period **Exclusions:** • Any screen that is not cervical or endocervical • Unsatisfactory smears **Numerator:** Number of women screened with a histological result of CIN 2 or 3. • Histological result must be within 1 year of screen

Indicator	Data Specifications	Calculation Description
Colon Screening Participation Rate Percentage of British Columbia screen-eligible population, ages 50-74, who completed a fecal immunochemical test (FIT) within a 30-month period with the BC Cancer Colon Screening Program. The BC Cancer Colon Screening Program started in November 2013.	**Data Sources:** • Colonoscopy Information System – FIT tests • PEOPLE2017 BC STATS – BC Population data • BC Cancer Registry (BCCR) – Invasive Colorectal cancers • Projected prevalence obtained from Cancer Surveillance & Outcomes (CSO) prevalence projection models **Calculation:** $\frac{\text{Eligible Participants}}{\text{Eligible Target Population}} \times 100\% =$ Colon Screening Participation Rate	**Denominator:** Population of BC, age 50-74, calculated using BC STATS population estimates. Population estimates are linearly interpolated to obtain the estimated population at the end of the time period of interest. **Exclusions:** • Adjustments are made for patients with a prior diagnosis of colorectal cancer **Numerator:** Number of unique participants in BC, who are aged 50-74 at the end of the reporting period date, who have had at least one FIT test within the previous 30 month period. **Exclusions:** • Northern Health Participants • Cancelled or deleted requisitions
Colon Screening Retention Rate Percentage of BC Cancer Colon Screening Program participants, ages 50-72, who returned for a subsequent FIT within 30 months of a negative FIT.	**Data Sources:** • Colonoscopy Information System – FIT tests **Calculation:** Using one minus the Kaplan-Meier estimator of survival function based on clients coming back for a screen after initial negative screen in the period of interest.	**Exclusions:** • Northern Health Participants • Cancelled, deleted, or unsatisfactory FITS **Model:** To build Kaplan-Meier model for retention rate, we take the negative FITs for which we have at least 30 months of follow-up (24 month return time plus 6 months buffer). Then look forward to see how many of the negative FITs came back for a subsequent screen. Clients returning for a subsequent screen are coded as “events” and the clients not coming back are censored using the date of the data pull. Retention rate at a given time point is then one minus the Kaplan-Meier estimate at that time point.
Colon Screening FIT Positivity Rate Percentage of BC Cancer Colon Screening participants, ages 50-74, that had a positive FIT result and are referred for further testing.	**Data Sources:** • Colonoscopy Information System – FIT tests **Calculation:** $\frac{\text{Number of positive FITs}}{\text{Total valid FITs}} \times 100\% =$ FIT Positivity Rate	**Denominator:** Total number of FITs, for clients aged 50-74 at the time of FIT. **Exclusions:** • Northern Health Participants • Cancelled, deleted, or unsatisfactory FITS **Numerator:** Number of positive FITs

Indicator	Data Specifications	Calculation Description
Colon Screening Colonoscopy Wait Times Percent of BC Cancer Colon Screening Program participants, ages 50-74, with a positive FIT result who received a colonoscopy within 60 days after screening.	**Data Sources:** • Colonoscopy Information System – FIT tests **Calculation:** Participants with a positive FIT test with a Colposcopy within 60 days / All Participants with a positive FIT test x 100% = Percent within Target Interval	**Denominator:** Total number of positive FITs, for clients aged 50-74 at the time of FIT. **Exclusions:** • Northern Health Participants • Cancelled, deleted, or unsatisfactory FITS **Numerator:** Number of positive FITs with a colonoscopy within 60 days
FIT Positive Predictive Value (PPV) Percentage of BC Cancer Colon Screening participants, ages 50-74 that had a positive FIT result and colonoscopy and were diagnosed with an adenoma.	**Data Sources:** • Colonoscopy Information System – FIT tests **Calculation:** Number of positive fits with colonoscopy with adenoma / Number of positive FITs with colonoscopy x 100% = PPV for Average Risk	**Denominator:** Number of positive FITs, for clients aged 50-74 at the time of FIT **Exclusions:** • Positive FITs with no final pathology • Positive FITs who did not proceed to colonoscopy **Numerator:** Number of patients with a positive FIT, with a pathology result of adenoma
Colon Screening Cancer Detection Rate Number of cancers detected per 1,000 FITs in BC Cancer Colon Screening Program participants, ages 50-74.	**Data Sources:** • Colonoscopy Information System – FIT tests **Calculation:** Number of FITs with a cancer detected at pathology or follow-up / Total number of valid FITs x 1000 = Cancer Detection Rate	**Denominator:** Total number of valid FITs, for clients aged 50-74 at the time of FIT. **Exclusions:** • Northern Health participants • Cancelled, deleted, or unsatisfactory FITs, assessments, and colonoscopies **Numerator:** Number of positive FIT with detected cancer, for clients aged 50-74 at the time of FIT.

Appendix 3: Contributors

The following individuals contributed to the development of this report: listed in alphabetical order by last name.

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