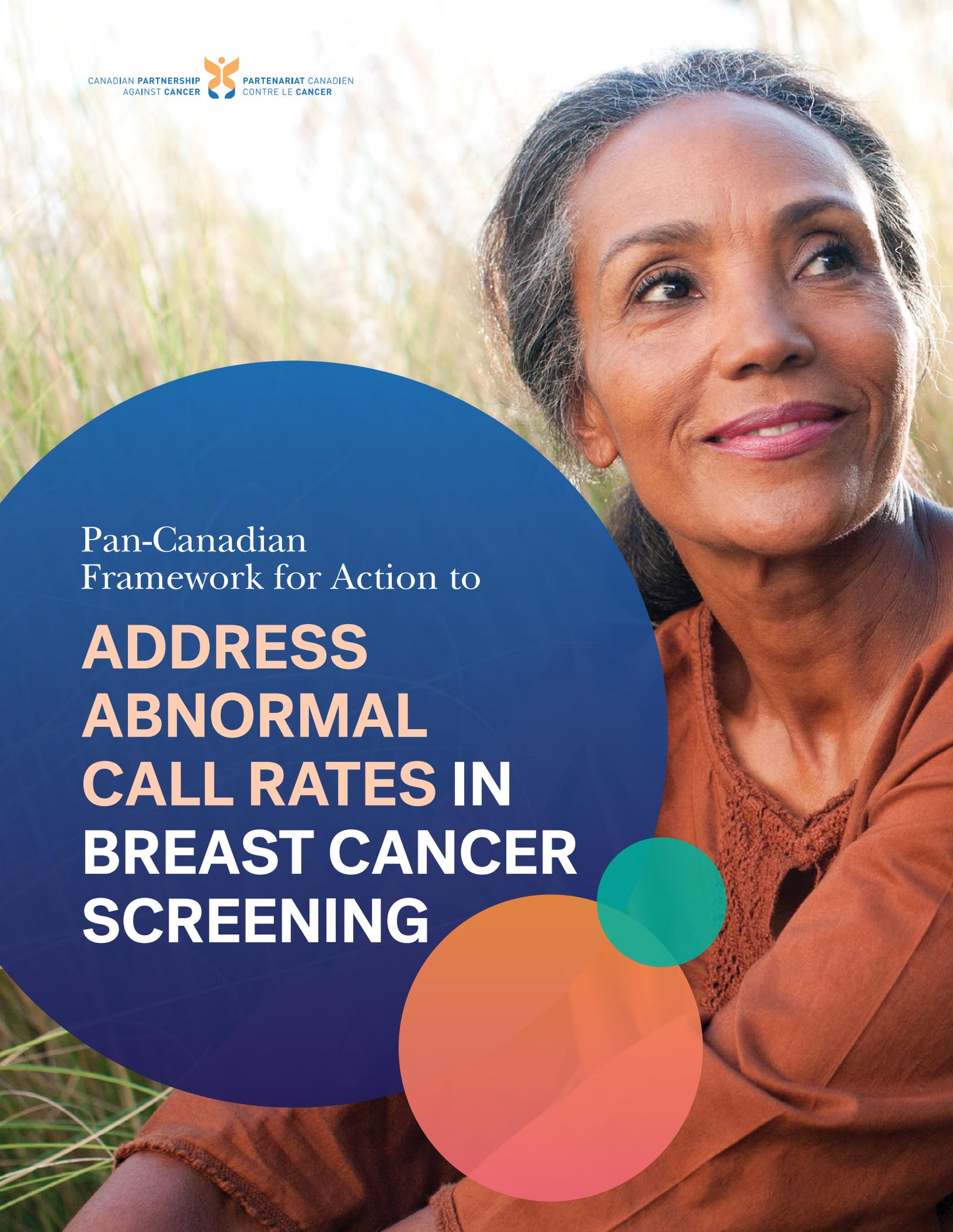




Pan-Canadian  
Framework for Action to

**ADDRESS  
ABNORMAL  
CALL RATES IN  
BREAST CANCER  
SCREENING**



## Endorsement



Canadian Society of Breast Imaging  
Soci t  canadienne de l'imagerie mammaire

This Framework has been endorsed by the  
Canadian Society of Breast Imaging (CSBI).



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# 1.0 Acknowledgements

**This document provides a Framework for Action (“the Framework”) that describes approaches for addressing observed increases in abnormal call rate (ACR) within Canada, a key indicator of quality in breast cancer screening programs.**

Development of the Framework would not have been possible without the contribution and participation of members of the Canadian Breast Cancer Screening Network (CBCSN) and ACR Project Advisors. The Canadian Partnership Against Cancer (“the Partnership”) would like to acknowledge the following groups and individuals in the production of this Framework:

**The people from all provinces and territories who informed the refreshed Canadian Strategy for Cancer Control (“Strategy”) and called upon the Partnership and the broader system to **diagnose cancer faster, accurately and at an earlier stage;****

**The CBCSN for identifying the trend in ACR as a priority and opportunity to advance quality improvements in breast cancer screening with mammography; and,**

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## Foreword

**Most people who undergo screening for cancer will not have cancer. Yet every year, thousands of women screened for breast cancer will be told that their mammogram is abnormal. What follows is one or more diagnostic tests to further clarify the abnormal findings from the screening mammogram. For those screened and recalled for further testing, the process can be time intensive, involve travel costs and possible wage loss. This experience along with the possibility of a cancer diagnosis can lead to stress and anxiety.**



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*Nancy*

Because the mammogram is not a “perfect test”, it can identify an area that looks like a cancer but is later shown to be normal — a false positive result. Most abnormalities identified on a screening mammogram will ultimately be confirmed to be normal after further diagnostic testing.

In Canada, the false positive rate or the abnormal call rate (ACR) for screening mammography has increased in the last few years without a corresponding increase in cancer detection rates. Therefore, Canada’s breast screening programs are not as accurate as they could be, and this is leading to the unnecessary use of health care system resources and more importantly, unnecessary harms to the women being screened. This can also increase the waiting time for diagnostic testing and treatment.

For a cancer screening program to be effective, the benefits must outweigh the risks. A rise in the abnormal call rate can tip this balance and decrease the benefit of mammographic screening.

The introduction or strengthening of approaches to support optimal ACRs can help maximize the benefits and minimize the harms of breast cancer screening. Across Canada, ongoing monitoring and evaluation within screening programs has identified the optimizing of abnormal call rate as a quality improvement opportunity. Optimizing ACRs begins with enhancing education for radiologists with a greater focus on quality assurance. There is an opportunity to improve the practices and processes of screening and diagnostic mammograms to ensure optimal interpretation.

**The Pan-Canadian Framework for Action to Address Abnormal Call Rates in Breast Cancer Screening** is a step towards bridging this gap. The Framework provides evidence-based approaches to help breast screening and breast imaging programs and providers achieve optimal abnormal call rates. It provides guidance to ensure breast screening is minimizing harm to patients and that there is more efficient and sustainable use of health system resources.

This Framework was developed to ensure those screened for breast cancer benefit from high-quality, standardized breast screening practices and unnecessary follow-up tests and encounters with the health system are avoided. It also comes at an important time. With COVID-19 placing new demands on Canada’s health system, it is critical that we reduce the use of healthcare resources while maintaining the quality of care. Improved breast screening practices that deliver more accurate results and reduce abnormal call rates are key to sustaining high-quality breast cancer screening in Canada.

# Executive Summary



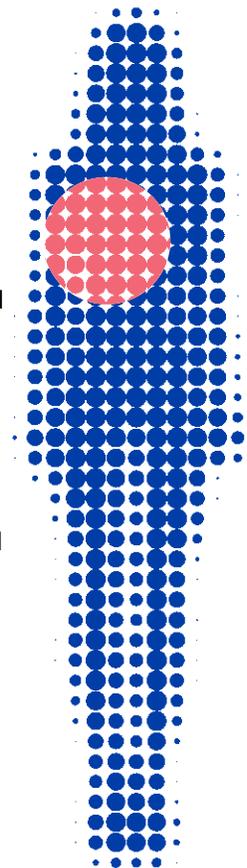
## 2.0 Executive Summary

### 2.1 Introduction and Abnormal Call Rate Trends

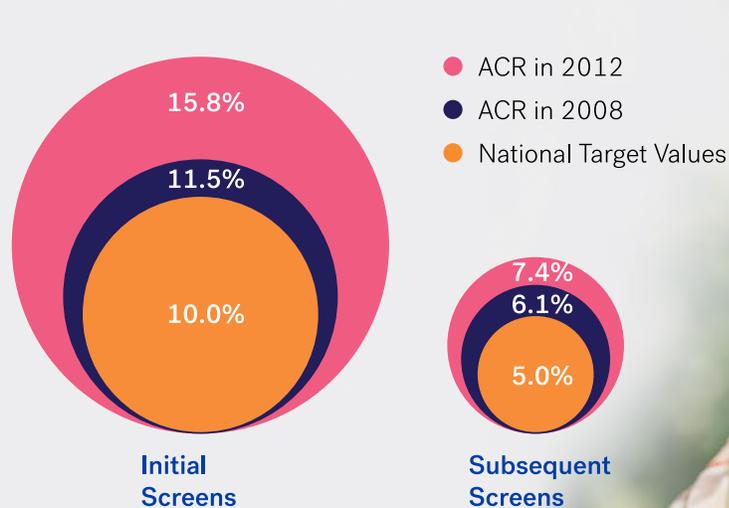
In 2019, the refreshed [Canadian Strategy for Cancer Control \(“Strategy”\)](#) was released. The Strategy establishes a 10-year roadmap focused on 8 overall priorities identified by people in Canada. The Strategy calls cancer system stakeholders and partners to action towards improving equity in the cancer system and delivering quality care in a sustainable manner. Diagnosing cancer faster, accurately and at an earlier stage is an identified priority within the Strategy.<sup>1</sup>

Breast cancer is the most common cancer diagnosed among Canadian women, and it is the second leading cause of cancer deaths among women. In Canada, 88% of people diagnosed with breast cancer will survive at least 5 years after their diagnosis. The introduction of mammography-based screening programs between 1990 and 2000 has been a key contributor to improvements in breast cancer outcomes.<sup>2</sup> Given that the majority of people screened will not have cancer, the chance of screening-related harm to patients must be limited.

Screening programs therefore need to deliver both timely and accurate screening results to help ensure patients do not suffer undue stress or harm from unnecessary follow-up procedures. An advantage of screening programs is that they are typically monitored and evaluated through a series of key quality indicators to facilitate ongoing assessment of morbidity, mortality, and the potential harms of screening. The abnormal call rate (ACR) — the percentage of mammograms identified as abnormal — is a key indicator of quality in breast cancer screening programs.



**FIGURE 1:** ACR INCREASE BETWEEN 2008-2012



In Canada, the ACR has been observed to exceed national target values (<10% of initial screens; <5% of subsequent screens) over the last 10 years. Between 2008 and 2012, the ACR increased for initial screens (11.5% to 15.8%) and subsequent screens (6.1% to 7.4%).<sup>3</sup> During this same time period, the cancer detection rate (CDR) remained stable at 3.7 cases per 1,000 subsequent screens. This means more individuals had additional testing for abnormal screening results that did not detect any more cancers; in other words, there were more false positive screening results reported. A small increase observed in CDR between 2012 and 2016, however, should be noted.

As follow-up testing can harm patients' physical and psychological well-being, increases in the rate of false positive results may mean patients are suffering potentially avoidable harms from diagnostic tests.<sup>4</sup> The observed trends in ACRs in the presence of stable CDRs in Canada therefore presents an opportunity for clinicians, leaders of screening programs, and pan-Canadian professional organizations to address high ACRs to ensure screening is not causing undue harm to patients, and that there is efficient and sustainable use of health system resources.

## 2.2 Pan-Canadian Framework

The Canadian breast screening community, with the support of the Partnership, has embarked on the development of an evidence-informed Framework to guide pan-Canadian and jurisdictional efforts to achieve optimal ACRs and, in turn, maximize benefits and minimize harms of breast cancer screening. Much work has been done to maintain quality improvements of mammography screening in Canada.

However, the observed increase in ACR in Canada highlights an opportunity for focused action to ensure that screening best identifies people who would benefit from further testing. Evidence-based practices can be introduced or strengthened to help support the achievement of optimal ACRs.

The pan-Canadian Framework for Action aims to address ACR trends through six evidence-informed approaches, as illustrated below.

FIGURE 2: FRAMEWORK FOR ACTION



The Framework was informed by an evidence synthesis of factors associated with ACRs in breast cancer screening, consultations with clinical experts and screening program leads in Canada, Australia and the United Kingdom, and the prioritization of best practices by key partners in the breast screening community at a pan-Canadian workshop hosted by the Partnership in June 2019.

The Framework serves as a guide for partners to identify and tailor strategies based on programmatic priorities and needs to achieve optimal ACRs.

As elements of the Framework are explored, it is important for screening programs to incorporate equity considerations in the planning or implementation of quality assurance practices (refer to Section 4.3.1 for additional details). Through continuous quality improvement advancements to address ACRs, the benefits of screening programs can be maintained while minimizing potential harms to patients and costs to the health care system. Programmatic efforts to create a supportive environment to maintain robust quality assurance and improvement practices can enable opportunities to achieve optimal ACRs and improve patient outcomes.

As the COVID-19 pandemic has placed an increased demand on Canada's health care system, resuming temporarily suspended screening services may increase pressure on the system to provide screening that has been delayed. Strategies described in the Framework present implementation opportunities to reduce ACRs and prevent unnecessary follow-up procedures as an approach to also optimize the restoration of breast screening programs. The evidence-based quality improvement practices in this Framework provide approaches that can strengthen breast screening programs to ensure high quality screening services are continuously provided.



# Introduction



# 3.0 Introduction

## 3.1 The Canadian Strategy for Cancer Control

In 2019, the refreshed [Canadian Strategy for Cancer Control](#) (“Strategy”) was released. The Strategy establishes a 10-year roadmap focused on 8 priorities identified by people in Canada. The Strategy calls cancer system stakeholders and partners to action to improve equity in the cancer system and deliver quality care in a sustainable manner. As stewards of the Strategy, the Canadian Partnership Against Cancer (the Partnership) is responsible for working with partners to advance the priorities and actions of the refreshed Strategy and to report on progress and impact across Canada.

Diagnosing cancer faster, accurately, and at an earlier stage is an identified priority within the Strategy.<sup>1</sup> For individuals participating in breast cancer screening, waiting for a screening test result, receiving an abnormal screening result, and undergoing follow-up testing can be a stressful experience. The Canadian Task Force on Preventive Health Care (“Task Force”) further highlights that abnormal screening results carry a multitude of costs: emotional and physical costs (in the case of follow-up tests and the possibility of complications) to patients and their families; and financial costs to the health care system due to additional testing which may be unnecessary.<sup>4</sup> In addition, follow-up testing carried out unnecessarily diverts resources



from others who may be waiting for testing or require further investigation of an abnormal result. To minimize potential harms to patients and costs to the health care system, it is important that patients are provided with accurate screening test results.

## 3.2 Screening Mammography Programs in Canada

Breast cancer is the most common cancer diagnosed among women in Canada, and it is the second leading cause of cancer deaths among women. In Canada, it is estimated that about 1 in 8 women will develop breast cancer during their lifetime, and about 1 in 33 women will die from breast cancer.<sup>5</sup>

Across the country, mammography-based screening programs introduced between 1990 and 2000 have been a key contributor to improvements in breast cancer outcomes.<sup>2</sup> These programs aim to either find cancer early when treatment can be more effective, or correctly confirm the absence of disease.<sup>6</sup> The introduction, and continuous quality improvement of, breast cancer screening programs and advancements in screening technology — coupled with improvements in treatment strategies — have contributed to a

35% reduction in breast cancer mortality rates between 1992 and 2011.<sup>7</sup> Thanks to advances in screening and treatment, breast cancer patients have some of the best survival outcomes amongst people diagnosed with cancer. Approximately 88% of all women who are diagnosed with breast cancer will be alive at least five years post-diagnosis.<sup>8</sup>

Breast cancer screening is a public health intervention, and therefore follows the principles of population-based screening with the ultimate goal being that the overall benefits of screening should outweigh the potential harms.<sup>9</sup> Given that the majority of people screened will not have cancer, the chance of harm to patients must be limited. Screening programs therefore need to deliver accurate screening results to ensure patients do not suffer undue stress or harm from unnecessary follow-up procedures.

## 3.3 Abnormal Call Rate Trends

An advantage of organized screening programs is that they are designed to regularly monitor key performance indicators to ensure that the benefits of screening are being maximized, and harms are being minimized through a cycle of continuous quality improvement. The abnormal call rate (ACR) – the percentage of mammograms identified as abnormal, and therefore requiring additional testing and follow-up — is a key indicator of quality in breast cancer screening programs. An ideal ACR is one that falls at an “optimal” level

where the maximum number of cancers are detected in follow-up on abnormal results, while the fewest number of those abnormal results are “false positives”. As such, ACR must be examined in conjunction with other quality metrics, such as the cancer detection rate (CDR), positive predictive value (PPV), and sensitivity.<sup>7</sup>

- **CDR is the proportion of patients found to have breast cancer — i.e., the number of cancers detected per 1,000 patients screened.**

- **PPV is the chance that if a patient has an abnormal screen, they actually have cancer. PPV is particularly important when considering ACR, as a high PPV indicates that screening participants recalled for further assessment have a greater probability of having breast cancer.**
- **Sensitivity is the chance of finding a cancer if it is present.**

### 3.3.1 ACR and Quality Screening: Why Does It Matter?

If the ACR is too low, it may increase the risk of cancers being missed; but if the ACR is too high, individuals who do not have cancer will be referred for unnecessary additional tests.

Receiving an abnormal screening result and follow-up assessments can be a stressful experience with potential harms to physical and psychological wellbeing. Unnecessary follow-up testing can also have an impact on health care resources by diverting budgets and expert time from other work in order to carry out further assessments.<sup>4</sup> As ACR is an important indicator of a breast cancer screening program's efficacy, optimization

efforts have been the focus of international research and policy. Evidence-based practices have been identified that can be introduced to support program achievement of optimal ACRs.

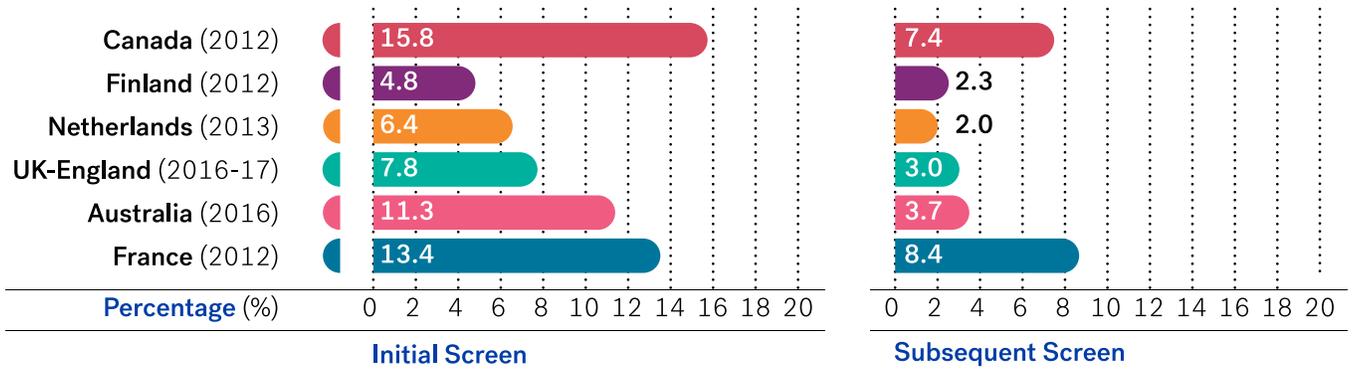
As the COVID-19 pandemic has made an impact on Canada's health care system capacity to deliver high quality screening services, efforts to support achievement of optimal ACRs can reduce the impact of false positives including the unnecessary use of resources in the health system, and most importantly, minimize harms to people screened.

### 3.3.2 International ACR

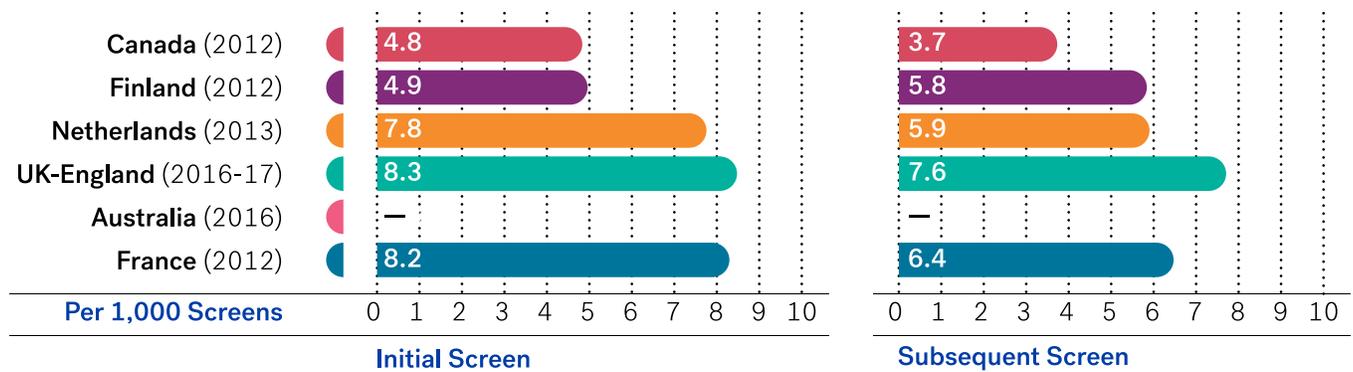
Internationally, ACRs (also referred to as "recall rates" or "referrals for further assessment" in other countries) vary widely.<sup>10</sup> Canadian and international data for ACRs and PPVs for both initial and subsequent screens are presented below in Figure 3. Between 2012 and 2013, the international ACRs ranged from a high of 13.4% in France (PPV = 5.4%) to a

low of 4.8% in Finland (PPV = 10.2%) for initial screening, and from a high of 8.4% in France (PPV = 7.9%) to a low of 2.0% in the Netherlands (PPV=29.5%) for subsequent screening. The ACR in Canada is higher than those in European countries or in Australia, however, the CDR is comparable to that in Europe and lower than in Australia.<sup>11</sup>

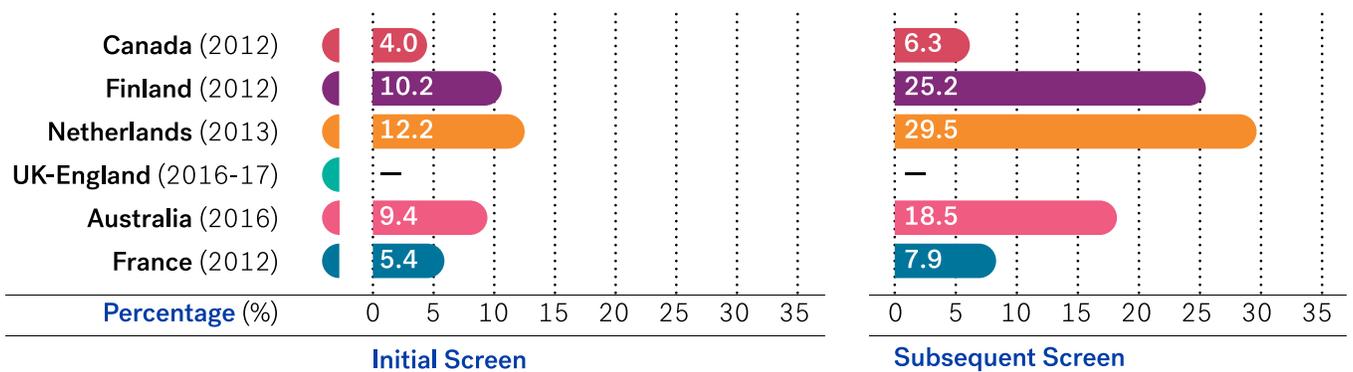
**FIGURE 3a: INTERNATIONAL COMPARISON OF ABNORMAL CALL RATES (ACR)**  
in breast cancer screening by initial and subsequent screen



**FIGURE 3b: INTERNATIONAL COMPARISON OF CANCER DETECTION RATES (CDR)**  
per 1,000 screens in breast cancer screening by initial and subsequent screen



**FIGURE 3c: INTERNATIONAL COMPARISON OF POSITIVE PREDICTED VALUES (PPV)**  
rates in breast cancer screening by initial and subsequent screen



— Data not available

Canadian data source: Provincial and territorial breast cancer screening programs.

International data source: Centre for Effective Practice, Canadian Partnership Against Cancer. *Abnormal Call Rates for Breast Cancer Screening*. Prepared for the Canadian Partnership Against Cancer. 2019 Mar 31.

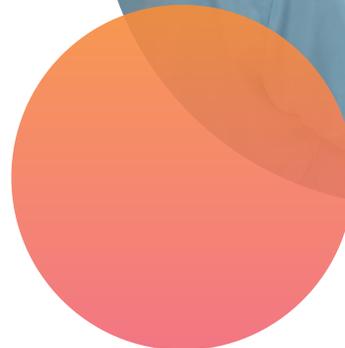
**TABLE 1: ACR TARGET GUIDELINES**

Guidelines	Initial	Subsequent
<b>Canadian National ACR Target</b>	<10%	<5%
<b>European Guidelines for Quality Assurance in Breast Cancer Screening and Diagnosis Recall Rate Target</b>	<7% (acceptable) <5% (desirable)	<5% (acceptable) <3% (desirable)
<b>UK National Health Service Screening Program Referral to Assessment</b>	<10% (acceptable) <7% (achievable)	<7% (acceptable) <5% (achievable)

Target guidelines for acceptable ACRs also vary internationally (Table 1), however, the Canadian ACR target is within range of other countries' established targets with comparable health systems and screening programs. While recall rates in France\* are higher than those in other European countries, programs in Australia and the UK are within range of their ACR targets, yet Canada's ACR exceeds the Canadian and international established targets for ACR.

Programs have implemented quality assurance practices that are intended to enhance the quality of screening. However, differences in quality assurance practices between countries and programs within Canada can impact program performance to meet ACR targets. Table 2 in section 3.3.4 provides a summary of quality assurance practices that have been implemented in Canada and internationally to support programs with achieving the ACR target.

\* Recall rates in France are high in part because all people with dense breast tissue are screened with supplemental breast ultrasound. The ACR includes the recalls for ultrasound and mammography and the addition of ultrasound is known to increase the ACR.

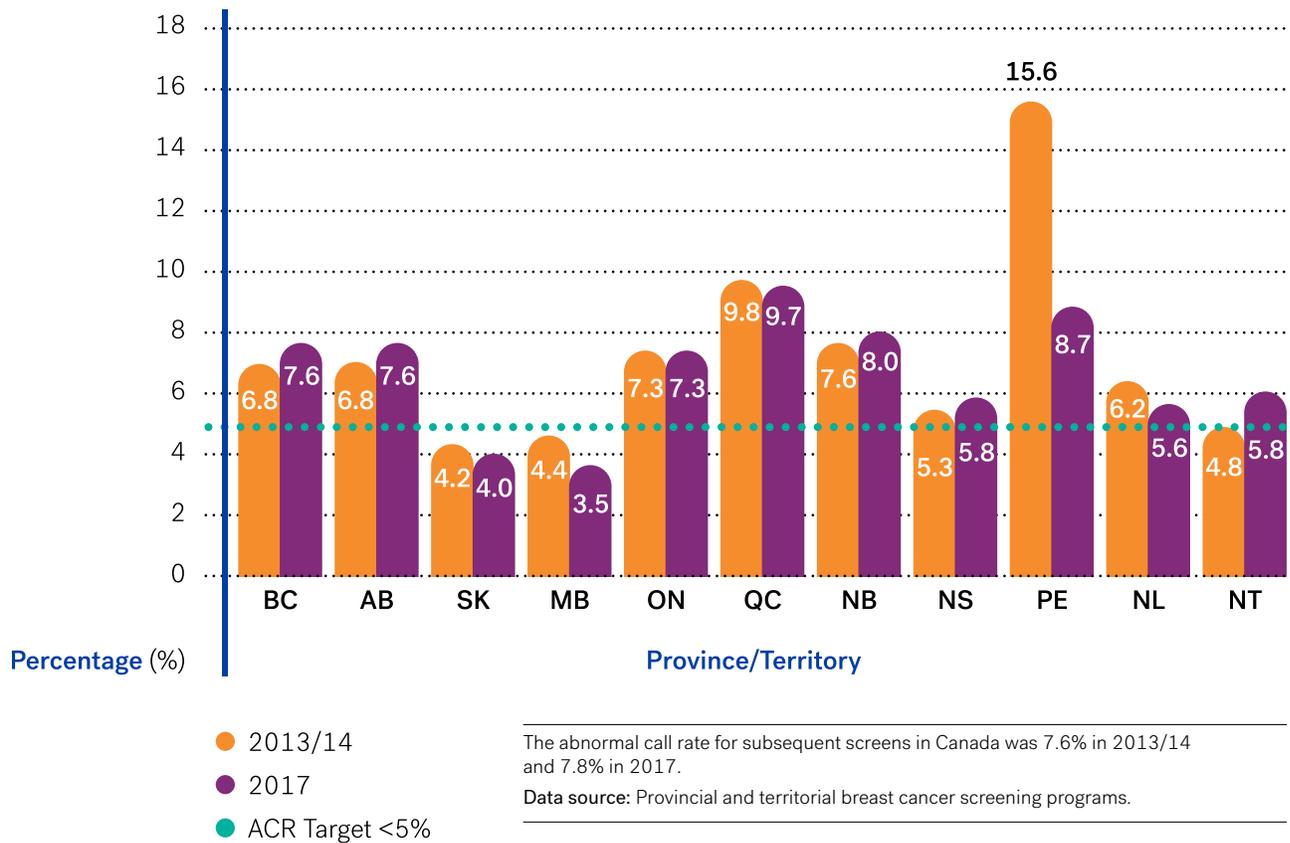


### 3.3.3 ACR Trends in Canada

In Canada, the ACR has been observed to exceed current national target values of less than 10% of initial screens, and less than 5% of subsequent screens. ACRs for both initial and subsequent screens vary widely across Canadian provinces and territories.

For example, in 2013-2014, ACRs for subsequent screens ranged from 4.2% in Saskatchewan to 15.6% in Prince Edward Island. Data presented for 2013/14 and 2017 highlights that many breast cancer screening programs are above the national target of less than 5% for subsequent screens (Figure 4).

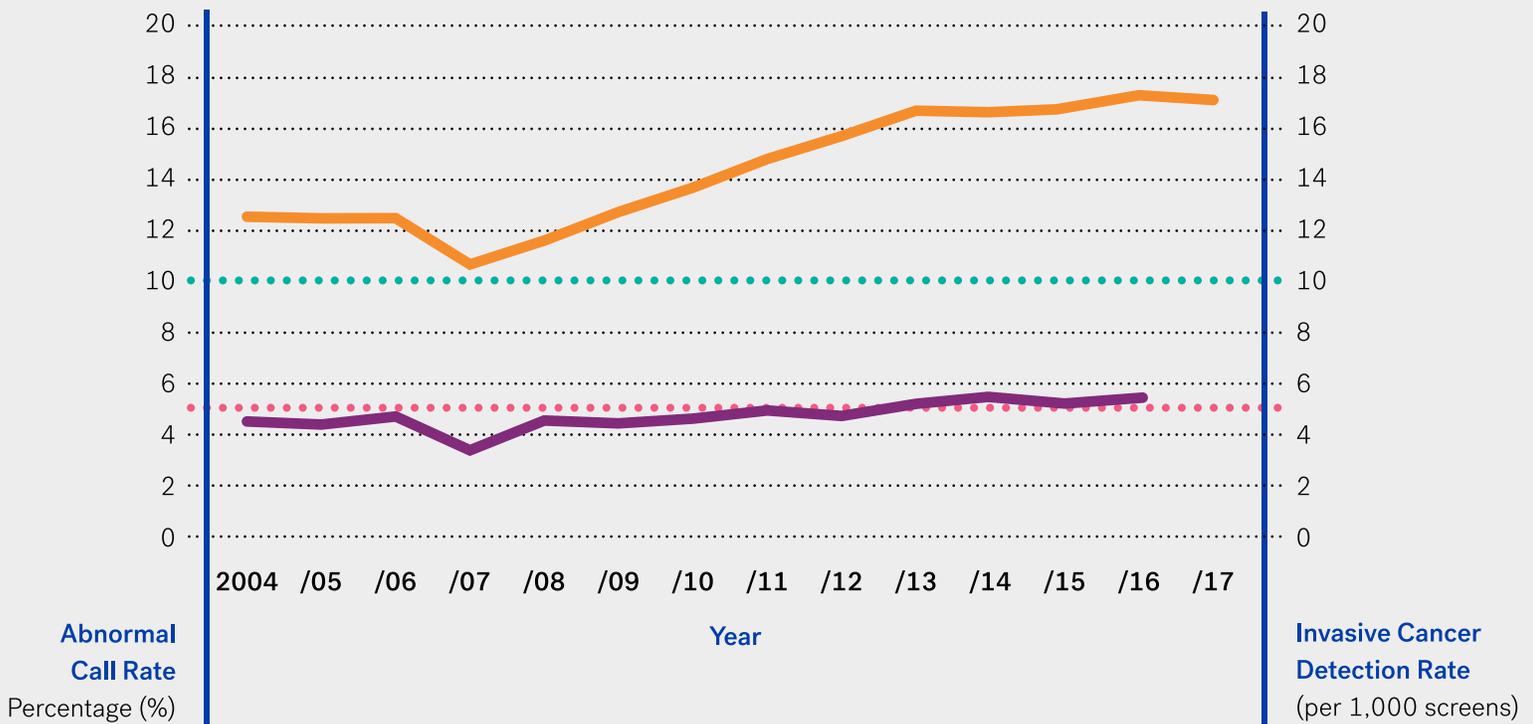
**FIGURE 4: ABNORMAL CALL RATE FOR SUBSEQUENT SCREENS** by province/territory, women aged 50-69 years — 2013/14 and 2017 screening years



Over time, there has been an increase and then stabilization of observed ACRs in Canada. Between 2008 and 2012,

the ACR increased for initial screens (11.5% to 15.8%) (Figure 5) and subsequent screens (6.1% to 7.4%) (Figure 6).

**FIGURE 5: ABNORMAL CALL RATE AND INVASIVE CANCER DETECTION FOR INITIAL SCREENS IN CANADA\***, women aged 50-69 years from 2004 to 2017 screening years



- ACR
- ACR Target <10%
- CDR
- CDR Target >5 per 1,000

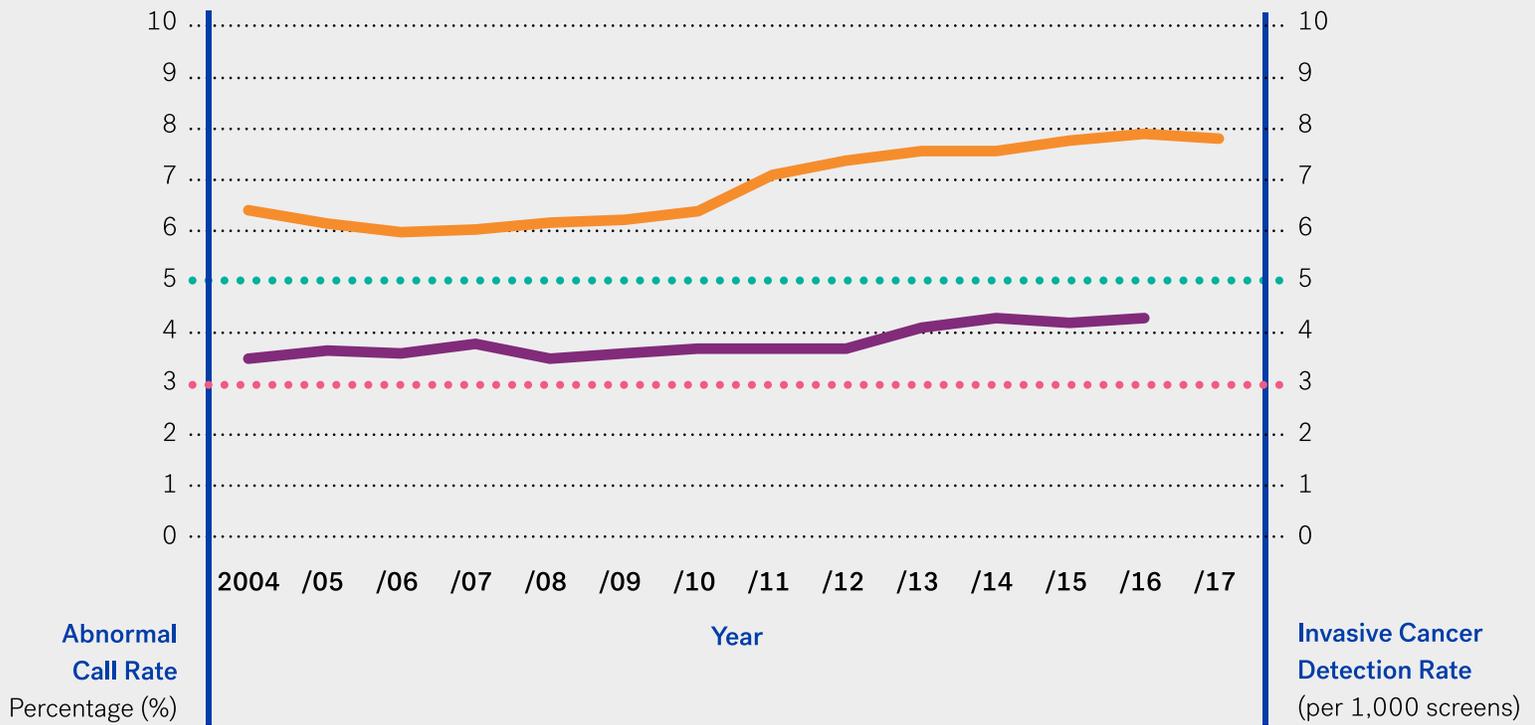
\* Includes all provinces and territories, except YT and NU. Data prior to 2007 exclude AB.

Abnormal call rate: Data after 2014 do not include NS.

Invasive cancer detection rate: Data from 2013 to 2016 do not include NS and NB. MB data in 2016 and 2017 might be underestimated. Data not shown for 2017 as it excludes ON, NB, NS, SK and QC only provided data for first 9 months.

Data source: Provincial and territorial breast cancer screening programs.

**FIGURE 6: ABNORMAL CALL RATE AND INVASIVE CANCER DETECTION RATE FOR SUBSEQUENT SCREENS IN CANADA\*, women aged 50-69 years — 2004 to 2017 screening years**



- ACR
- ACR Target <5%
- CDR
- CDR Target >3 per 1,000

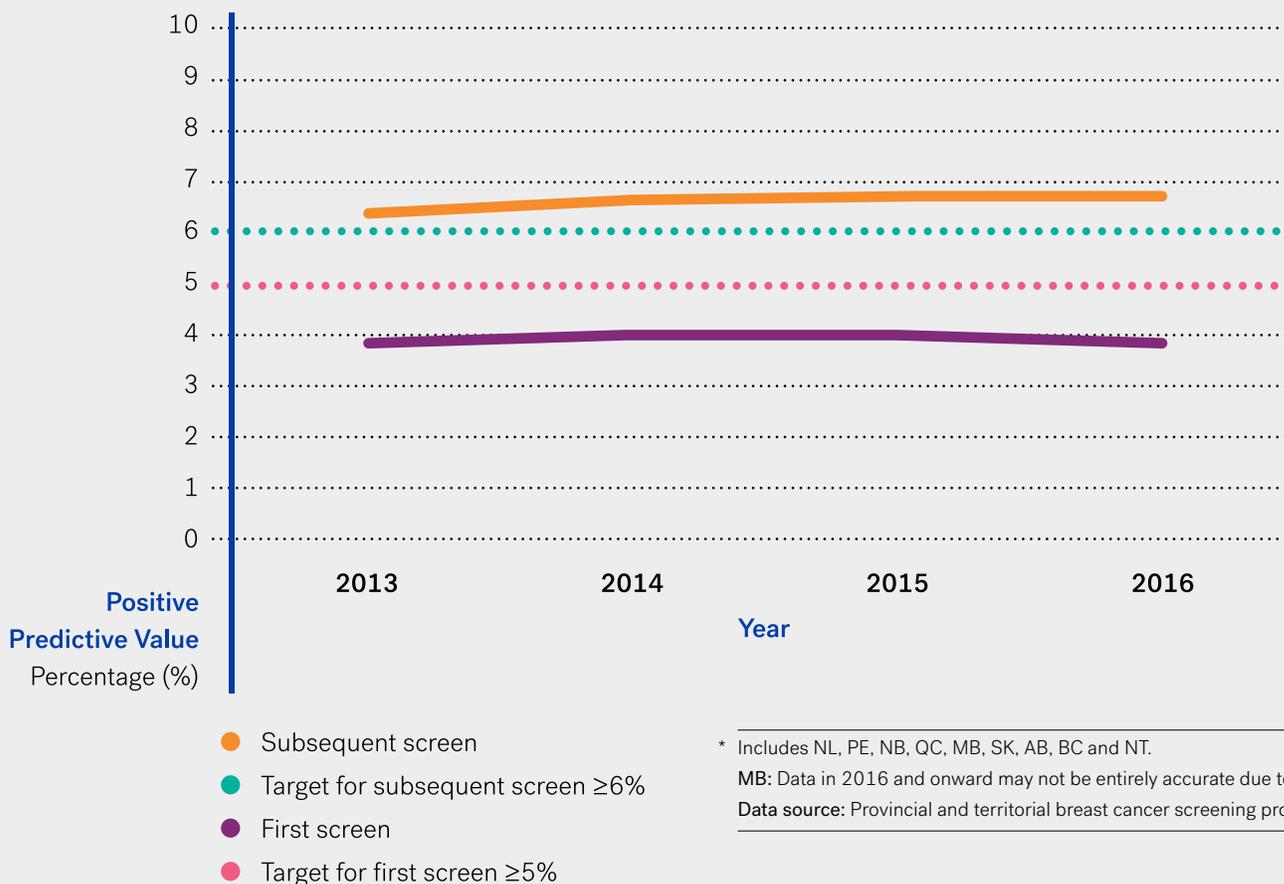
\* Includes all provinces and territories, except YT and NU. Data prior to 2007 exclude AB.

Abnormal call rate: Data after 2014 do not include NS.

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Data source: Provincial and territorial breast cancer screening programs.

**FIGURE 7: PERCENTAGE OF ABNORMAL CASES DIAGNOSED WITH BREAST CANCER (PPV) IN CANADA, by screening sequence, jurisdictions combined\* — 2013 to 2016**



However, during this same time period, the cancer detection rate remained stable at 3.7 cases per 1,000 subsequent screens. A corresponding decrease in the PPV was also observed, meaning that a lower percentage of individuals with abnormal mammograms were found to have breast cancer after diagnostic testing.<sup>7,10</sup> Since 2012, a slight increase in CDR has been observed (Figure 6) and between 2013 and 2016 the PPV has remained stable (Figure 7).

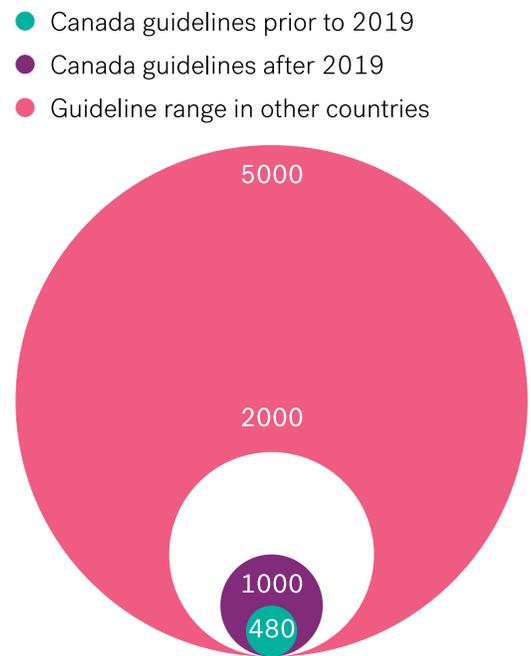
ACRs for both initial and subsequent screens have remained at a high level since 2013 exceeding national targets. Such results indicate that breast screening programs are sending more people to follow-up testing with abnormal screening results without finding additional cancers. Optimizing ACRs in Canada could minimize potential harms from follow-up tests and ensure that the benefits of screening are maintained.

### 3.3.4 Discussion: ACRs in Canada and Internationally

International recall rates and the trend in ACR observed in Canada have been influenced by a range of factors, including the technology used (film versus digital mammography), quality assurance practices, reader experience, mammographic features, and the priorities of screening participants. As the transition from screen-film to digital mammography has also occurred internationally, the high ACRs observed in Canada cannot solely be attributable to changes in mammography technology. It is likely that differences in quality assurance practices between breast screening programs observed with high ACR (e.g., Canada) and programs with low recall rates (e.g., Europe and Australia) have contributed to the upward ACR trend observed in Canada (Table 2). For example, targeted double reading of potential recalls has been observed to be associated with a decrease in recall rates. In Australia, double reading of mammograms is standard practice, but is not in Canada. Likewise, reading volumes have been shown to improve specificity. Guidelines for minimum reading volumes differ between countries. In 2019, the Canadian guidelines for minimum reading volume changed from 480 to 1000 reads per year, while many other countries require 2000 to 5000 reads, with observed ties to positive impacts on patient outcomes (Figure 8).

Differences in quality assurance practices may be influenced by programmatic recommendations for screening and guidelines for distinct target performance measures. This is often impacted by the relative value placed on addressing trade-offs between ACR and other performance metrics associated with mammography, including PPV and CDR. As breast screening technology advancements are made, however, current ACR national target values may require evaluation and refinement to optimize the achievement of acceptable ACRs that could support efforts to maintain the benefits of screening.

**FIGURE 8: MINIMUM READING VOLUME GUIDELINES**



Data obtained from the Canadian Association of Radiologists Mammography Accreditation Program.

**TABLE 2: PERFORMANCE MEASURES AND QUALITY ASSURANCE PRACTICES IN CANADA AND INTERNATIONALLY**

Jurisdiction	Recall Rate Category	Recall Rate (%)	Cancer Detection Rate (per 1000)	Quality Assurance Practices
<b>Canada</b>	<b>Higher</b>	Year(s): 2011-12 First screen: 15.5 Subsequent screens: 7.2	Year(s): 2001-12 First screen: 6.1 Subsequent screens: 4.5	<ul style="list-style-type: none"> <li>• Single reading</li> <li>• Voluntary accreditation</li> <li>• Minimum annual reading volume: 1000</li> <li>• Readers' qualifications: radiologists</li> </ul>
<b>USA</b>	<b>Higher</b>	Year(s): 2007-13 First/subsequent screens: 11.6	Year(s): 2007-13 First/subsequent screens: 5.1	<ul style="list-style-type: none"> <li>• Single reading</li> <li>• Mandatory accreditation</li> <li>• Minimum annual reading volume: 480</li> <li>• Readers' qualifications: radiologists and non-certified radiologists licensed to practice medicine and with training in mammography interpretation*</li> </ul>
<b>France</b>	<b>Higher</b>	Year(s): 2008 First screen: 12.2 Subsequent screens: 8.0	Year(s): 2008 First/subsequent screens: 6.3	<ul style="list-style-type: none"> <li>• Double reading of mammograms classified as negative by 1st reader; unilateral recall</li> <li>• Minimum annual reading volume: 500 (1st reader); 1500 (2nd reader)</li> <li>• Readers' qualifications: radiologists</li> </ul>
<b>Australia</b>	<b>Lower</b>	Year(s): 2013 First screen: 11.9 Subsequent screens: 3.9	Year(s): 2013 First screen: 10.7 Subsequent screens: 6.3	<ul style="list-style-type: none"> <li>• Double reading with consensus/arbitration</li> <li>• Mandatory accreditation</li> <li>• Minimum annual reading volume: 2000</li> <li>• Quarterly reporting of individual screen readers performance</li> <li>• Opportunity to interpret a standard test set with immediate feedback</li> <li>• Readers' qualifications: radiologists, breast physicians, general practitioners and radiographers</li> </ul>
<b>UK</b>	<b>Lower</b>	Year(s): 2015-16 First screen: 7.6 Subsequent screens: 3.0	Year(s): 2015-16 First/subsequent screens: 8.5	<ul style="list-style-type: none"> <li>• Double reading; arbitration required from services with recall rate higher than the minimum standard</li> <li>• Minimum annual reading volume: 5000</li> <li>• Opportunity to interpret a standard test set with immediate feedback</li> <li>• Reader's qualifications: radiologists, breast physicians, advanced practice and consultant radiographers</li> </ul>

Note: Information presented in this table was informed by a synthesis of relevant literature on factors association with ACR.

\* Mammography accreditation support requirements by the American College of Radiology for all interpreting physicians <https://accreditation.support.acr.org/support/solutions/articles/11000049778-interpreting-physician-mammography>

**TABLE 3: SUMMARY OF ACR TRENDS**

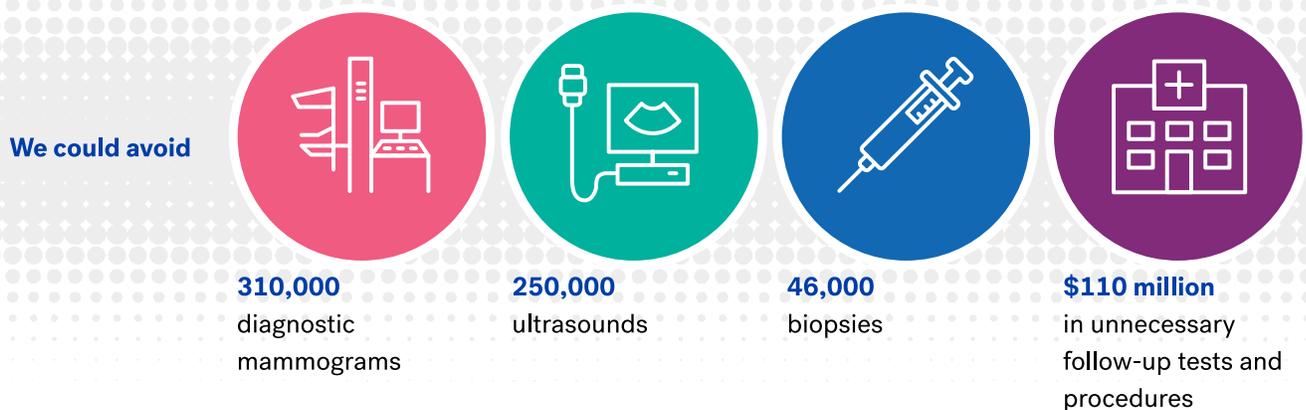
ACR in Canada has increased steadily in the past 10 years, exceeds national targets, as well as exceeds international target recall rates.	ACR in Canada has been increasing, while cancer detection rates have remained stable.	ACRs vary across provinces and territories, suggesting variations in screening programs and quality assurance practices.	High ACR without an increase in cancer detection indicates that more patients are undergoing diagnostic procedures without any added benefit.
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### 3.3.5 The Potential System Impact of Reducing ACR

These observed trends in ACR and CDR in Canada highlight an opportunity for clinicians, screening programs, and pan-Canadian professional organizations to collaboratively address high ACR to help ensure screening is not causing harm to patients from false positive screens. This in turn would allow the health care system to redirect resources from unnecessary follow-up procedures towards other areas of need.

Figure 9 details the potential impact of reducing the ACR in Canada for subsequent screens from its current level of 7.8% to 6% over the next ten years (from 2019 to 2029). Most of the cost savings (70%) come from averting unnecessary diagnostic mammograms and ultrasounds.

**FIGURE 9: POTENTIAL IMPACT OF REDUCING THE ACR TO 6% BY 2029\***



\* Note: Using OncoSim-Breast, the number of rescreens in 2019-2029 was estimated based on current breast cancer screening program policy in Canada. Results are model projects and do not represent observed data. This analysis assumed that the non-malignant biopsy rate would increase as false-positive increases; more recent data would be needed to confirm this assumption.

# Pan-Canadian Framework for Action



# 4.0 Pan-Canadian Framework for Action

## 4.1 Objectives of the Framework for Action on Abnormal Call Rates

### 4.1.1 ACR Project Overview

A pan-Canadian community of breast screening program representatives, radiologists, and professional associations, supported and convened by the Partnership through the Canadian Breast Cancer Screening Network (CBCSN), identified addressing ACRs as a priority in November 2017. This in turn led to the development of the Framework for Action. Developing the Framework involved a number of inputs, including engagement with the ACR Project and Advisory Teams comprised of clinical experts and screening program leads from the CBCSN, who provided guidance on the approach, analysis and interpretation of data from screening programs to further understandings of the opportunity to improve ACR trends; and a review of literature to identify evidence-informed best practices and the impact of quality improvement mechanisms to support achievement of optimal ACR. The development of the Framework was further supported through partner engagement and key informant interviews to understand the impact of identified approaches, as well as key enablers and barriers to successful implementation. A multi-disciplinary collaborative methodology was taken to develop the Framework for Action to ensure approaches to address ACR were evidence-informed and to identify key considerations for implementation within jurisdictions across Canada.

Detailed timelines and approaches to informing the Framework are described in Appendices B, D and E.

## 4.1.2 Strategic Objectives and Intended Outcomes

The Canadian breast cancer screening community, with the support of the Partnership, embarked on the development of an evidence-informed Framework to guide pan-Canadian and jurisdictional efforts to achieve optimal ACRs.

The Framework provides evidence-based approaches that act at three levels: practitioner, program, and system. With partners working together within both their region and across Canada at these three levels, the goal of optimizing ACRs can be realized.

### The Framework aims to:

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**1. Accelerate the uptake of the best available evidence-based clinical practices to help achieve optimal ACR;**

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**2. Support screening programs to implement approaches for quality improvement in breast cancer screening;**

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**3. Maintain the benefits and minimize the harms to patient wellbeing from screening and/or diagnostic assessments; and,**

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**4. Facilitate opportunities to evaluate, sustain, and refine current national target values for ACR.**

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### **INTENDED OUTCOMES OF THE FRAMEWORK FOR ACTION IN 2022**

Strategies and evidence-informed practices implemented to reach ACR target values to reduce unnecessary follow-up testing, support accurate cancer diagnosis, and ensure patients do not experience unnecessary emotional stress or physical harm, while supporting effective and sustainable breast screening services.

As Canada responds to the COVID-19 pandemic, we need to now, more than ever, address gaps and generate efficiencies in the cancer system. Our country's high abnormal call rates in breast cancer screening is an area we can address, and this Framework provides key players in the health system with the guidance to do so. It is important to ensure women screened don't experience unnecessary stress and anxiety, along with the other personal and financial challenges, associated with additional tests from an abnormal screening result. At this time, high abnormal call rates also require women spend more time in clinics undergoing diagnostic tests, which puts them at risk of potential exposure to COVID-19.



Canada's breast screening programs have made tremendous strides to advance the quality and safety of screening. We need to continue to work together to strengthen and expand evidence-based practices that can address abnormal call rates and maximize the benefits of quality breast screening and reduce the harms. This Framework provides an evidence-based approach to optimizing the abnormal call rate.

As healthcare leaders, and those on the frontlines of the health system, work together to address the COVID-19 pandemic, we need to limit the time people spend in hospitals and clinics. We must reduce unnecessary healthcare encounters while at the same time providing timely and appropriate care to the population.

*Gregory*

### **Gregory Doyle**

Expert Advisor,  
Chair, Canadian Breast Cancer  
Screening Network,  
ACR Project Advisor,  
Canadian Partnership  
Against Cancer

### 4.1.3 Who Will Use the Framework?

The Framework can be used by partners to identify evidence-informed practices to shape quality improvement approaches in breast cancer screening programs in Canada to meet the ACR targets. There are a multitude of roles for action across various levels, including the individual

provider, system, and program levels, as well as the pan-Canadian level. Buy-in and support from key partners are critical to ensure successful implementation of the approaches detailed in the Framework for Action.

#### Users of the Framework may include:

**Mammography technologists** are an integral element in the screening process. Quality of a screen begins with the mammogram technologist, and it will be necessary for technologists to see themselves in solutions to addressing high ACR.

**Radiologists and other healthcare professionals, researchers, and specialists** working in breast cancer screening to implement approaches on the ground and in their daily practice.

**Health system administrators**, including provincial screening program leads and diagnostic imaging section leads, will be essential to mandating the implementation of selected approaches to improve ACR.

**Decision makers at all levels of government** will need to consider the resources required to implement and maintain these initiatives, as well as the potential costs if programs forgo a change in practice that can improve patient outcomes and health system resource savings (Figure 9). The impact of practice and/or policy changes required to ensure successful implementation should also be considered.

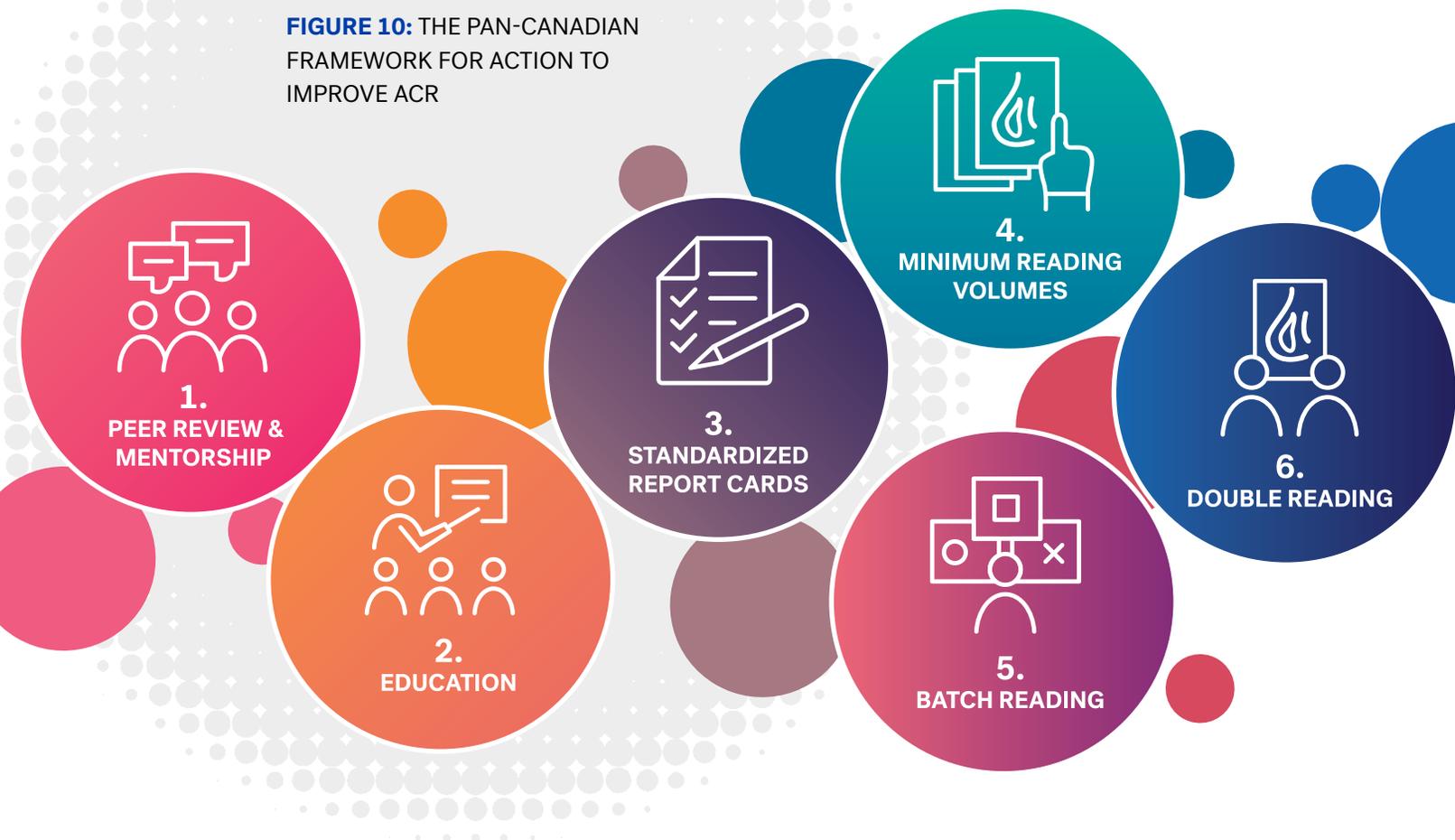
**Canadian Association of Radiologists (CAR)** and **Canadian Society of Breast Imaging (CSBI)** can help drive change from a national level and assist with policy related change and tools to support elements of the Framework.

## 4.2 Framework for Action: Approaches

The Pan-Canadian Framework for Action aims to address ACR trends through six evidence-informed approaches, as illustrated below in Figure 10.

Much work has been done to maintain quality improvements of mammography screening in Canada. However, the observed increase in ACR in Canada highlights an opportunity for focused action to ensure that screening best identifies people who would benefit from further testing. Evidence-based practices can be introduced or strengthened to help support the achievement of optimal ACRs.

**FIGURE 10:** THE PAN-CANADIAN FRAMEWORK FOR ACTION TO IMPROVE ACR



### The Framework was developed from:

- An evidence synthesis of factors associated with abnormal call rates in breast cancer screening, which highlights international differences in breast cancer screening programs and ACRs (e.g., comparisons between Canada, Europe and Australia).<sup>11</sup> Quality assurance practices such as double reading, minimum read volumes, accreditation, as well as feedback to radiologists were reviewed, including their impact on ACR in breast screening.
- Additional evidence gathered from consultation with pan-Canadian clinical and program leads in Canada, Australia, and the United Kingdom.
- Prioritization of best practices by key partners at a pan-Canadian workshop hosted by the Partnership in June 2019.

**ON THE FOLLOWING PAGES,** elements of the Framework are described, and examples of how they have been implemented internationally and in select jurisdictions in Canada are provided.



# 1&2 Peer Review, Mentorship and Education

Though peer review and education are common practice within a screening program, integration is clinic-specific and varies within and across jurisdictions. Peer review and mentorship involves peer radiologists working together on a regular basis to review screens and provide performance feedback on strengths and challenges, and thereby identifying areas for program optimization. Informal and formal education provide knowledge and tools to help radiologists improve in specific areas.

In Australia and the United Kingdom, immediate feedback via a web-based software is provided to radiologists following a screen read. The evidence synthesis suggests that performance feedback and educational components may be effective in decreasing recall rates while maintaining cancer detection rates.<sup>11</sup> Mullen and colleagues (2017)<sup>12</sup> also explored methods for achieving lower ACR; interventions involved raising awareness by having radiologists personally review their recalls, as well as increasing group awareness of team ACR. This method has led to decreases in ACR (larger than that achieved by double reading).

## EXAMPLES

Monash Breast Screening in Melbourne, Victoria, leverages compulsory audits of radiologists, which are completed every four years by interstate peers and are a part of radiologists' accreditation process. Based on their performance, radiologists are stratified into four levels, with level one readers considered clinical "champions". Clinical champions tend to complete more than 7,000 reads annually and act as arbitrators, as well as mentors to radiologists to support improvements.<sup>13</sup>

Most jurisdictions in Canada have a form of peer review/performance feedback in place, but frequency and consistency vary by clinic and program. For example:

- One breast screening clinic meets monthly to conduct quality assurance (QA) meetings. These meetings allow radiologists to review and discuss all cancer cases in an anonymous manner (Note: Reviewing all cases including true positives may not impact the likelihood of lowering ACR and false positives). In addition, technologists are required to attend one QA meeting annually. This program also completes reviews on all screen detected cancers, and interval cancer where the prior screening mammogram is within 5 years of the diagnosis. These cancer cases are reviewed at the monthly QA meetings.
- A provincial program has radiologists and mammogram technologists come together and discuss all cancer cases on a quarterly basis.<sup>†</sup>
- One provincial policy directs each screening site to organize reviews of their post-screen (i.e., interval) cancers, and their recalls of moderate and high suspicion. Sites determine appropriate frequency (e.g., quarterly or annually) and logistics (e.g., as a whole group or individually). (Note: There is an opportunity to consider changing this practice to include low suspicion recalls, as the objective is to decrease ACR).
- One region implements a number of review and feedback initiatives, including:
  - Reviewing 15 positive cases from screening on a quarterly basis and providing an opportunity to the radiologists to review prior imaging on each case. Please note that this may not necessarily reduce ACR and may increase it; however, it does provide valuable feedback about positive cases.
  - Providing lists of all recalled cases to each radiologist, on a bimonthly basis, for feedback of their respective callbacks. The introduction of this initiative reduced ACR in the region.
  - Meeting as a group of radiologists to anonymously review consecutive recalls by multiple radiologists. This provides mentorship to less experienced radiologists about ways to reduce ACR in an educational framework.
  - Meeting with screening technologists once per year to review positive cases and show cases that are examples of the impact of good positioning.

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<sup>†</sup> Content adapted from interviews with clinicians and screening programs in Canada.

## 3 Standardized Report Cards

Standardized report cards are considered a necessary practice by many jurisdictions, and have been crucial in making readers aware of their performance relative to targets, as well as their peers.

While report cards can vary in complexity, their main purpose is to report, on a regular basis, a radiologist's performance across a number of metrics, with key next steps and goals to improve and meet desired targets.



### EXAMPLES

In the United Kingdom, performance is reported in a quadrant with recommendations on how to move from quadrant to quadrant.<sup>14</sup> Annual quality control (QC) and Quality Assurance (QA) monitoring is undertaken at a national level, with information available online for each individual radiologist to see how their performance compares relative to others. A similar reporting mechanism has been developed by Ontario Health (Cancer Care Ontario) and the College of Physicians and Surgeons of Ontario, and British Columbia and Quebec are currently using elements of this system.

Similarly, in Australia, quarterly reporting of individual screen readers' performance is practiced. The QA report includes the reader's recall to assessment rate, and is provided to the reader, the Designated Radiologist, and the Clinical Director of the Service.<sup>11</sup>

Multiple programs in Canada identified report cards as key to ensuring radiologists understand their performance and how their performance compares to that of their peers to support opportunities for improvement.<sup>‡</sup> Measures commonly include: cancer detection rate, PPV, false positives, reading volumes, and ACR. It is important to note that the impact of report cards on radiologist performance is still being evaluated as there are identified challenges with ensuring radiologists open and review their report cards.

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‡ Content adapted from interviews with clinicians and screening programs in Canada.

Positive results were observed at one provincial breast screening program following the implementation of ongoing confidential feedback and the provision of report cards to each screening radiologist. Feedback and report cards focused on relevant indicators, with objectives for improvement if necessary. Each radiologist's progress was reviewed quarterly. At the time of the intervention, the average ACR was almost 9%. Three years after the intervention, the average ACR was less than 6% ( $p < 0.0001$ ), and sensitivity and specificity rates also increased, while interval cancer rates decreased.

**Appendix G includes anonymized sample statistics report cards from Saskatchewan Cancer Agency, Alberta Breast Cancer Screening Program, Newfoundland and Labrador Breast Screening Program, and BC Cancer, respectively.**

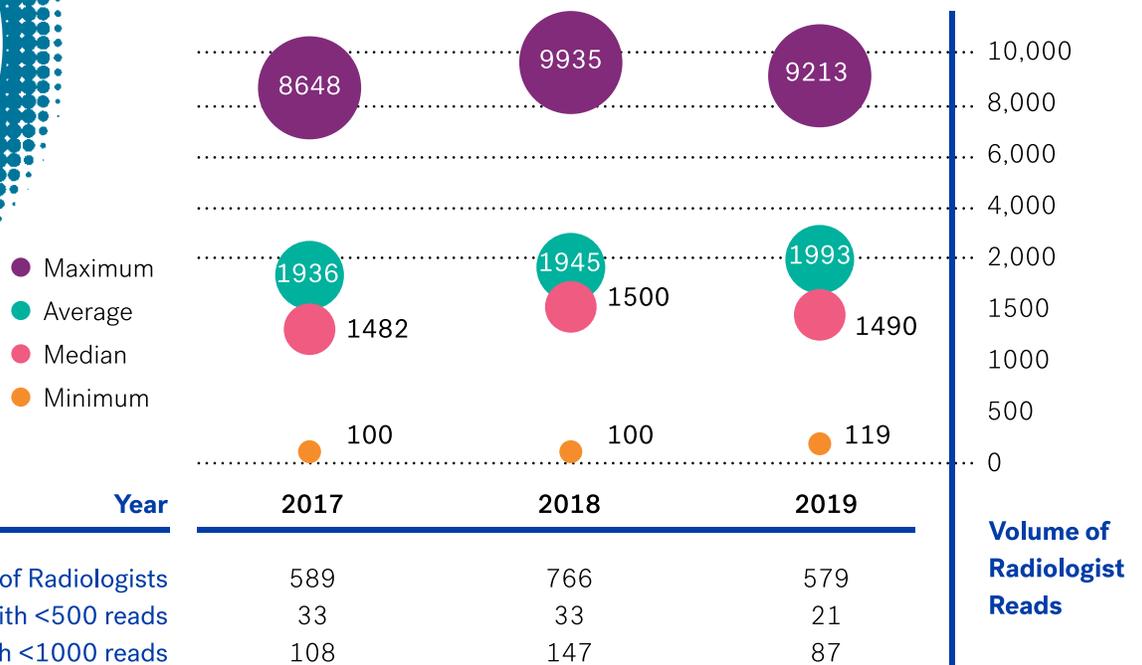
- One province has a standard annual individual statistics package. Key aspects of the package include: narrative format to facilitate interpretation; aggregate years' data to decrease concern from statistical annual variation in detection; and, semi-individualized prescription for practice optimization
- One screening clinic has a standardized feedback report that allows radiologists to view how their performance on many metrics compares with set benchmarks, as well as with averages across the province. One item included in the feedback is ACRs, which is shared in feedback reports as well as presented during various radiology conferences. Also included in this feedback is a colourful graph that shows where each radiologist falls on a continuum of ACR and cancer detection. The graphic includes quadrants showing where they fall compared to benchmarks and other radiologists in the province. This helps radiologists adjust their calls if they find they are drifting too far in one direction.
- One provincial breast screening program provides radiologists with annual screening statistics, including: comprehensive metrics (annual screen volumes, ACR, CDR, PPV, proportion of invasive cancers, sensitivity and specificity); definition and significance of the metrics; and direction to guide future efforts towards practice optimization. Feedback is presented in a colourful quadrant graph that shows where each radiologist falls on a continuum of standardized ACR and standardized cancer detection. This graph compares the radiologist against their peers and recommends how to move from quadrant to quadrant.

# 4 Minimum Reading Volumes

Minimum reading volumes refer to the minimum annual volume of screening mammograms read per radiologist, which vary greatly across jurisdictions. Reading volumes are critical as the more screens a radiologist reads, the more experience and expertise is gained, which tends to improve performance. In Canada, CAR's Mammography Accreditation Program benchmark for annual reading volume is 1,000. The change from 480 to 1,000 reads per year was made based on evidence

suggesting read volumes of less than 1,000 per year do not allow for an adequate review of radiologist performance.<sup>16</sup> In addition, it was recognized that many countries require 2,000 to 5,000 reads, and that increasing the number in settings where human resource staffing and capacity is not an issue could positively impact patient outcomes in Canada. Details on the number of screen mammograms read by a radiologist per year is described in Figure 11.

**FIGURE 11: DISTRIBUTION OF THE NUMBER OF MAMMOGRAPHY EXAM READS** by radiologists per year — 2017 to 2019\*



Year	2017	2018	2019
Number of Radiologists	589	766	579
Number of radiologists with <500 reads	33	33	21
Number of radiologists with <1000 reads	108	147	87

\* Data obtained from the Canadian Association of Radiologists Mammography Accreditation Program. Data includes radiologists who may only be reading diagnostic mammograms.

European guidelines require 5,000 mammograms per year, Australian guidelines require 2,000 reads per year, while 1,000 reads per year are accepted in Canada, and 480 in the United States.<sup>11</sup> A Canadian study demonstrated that increasing reading volumes has the greatest impact up to approximately 3,000 mammogram reads per year.<sup>15</sup> Experts in Australia and the United Kingdom also indicated that specificity improves up until approximately 3,000 reads, stabilization is observed around 4,000 reads, and benefits of additional reads per year diminish beyond this point.<sup>13</sup>

From an equity perspective, resource supports should be made available to radiologists practicing in rural areas who may experience challenges in meeting minimum reading volumes. Approaches such as double reads, conference reads and/or online reads, and where deemed appropriate, acceptance of lower volumes in limited resource clinical settings, can support radiologists with meeting requirements for minimum reading volumes.

## EXAMPLES

Breast Screen Australia (BSA) standards require that radiologists read more than 2,000 screens per year; however, at Monash Breast Screening, the majority of radiologists read greater than 5,000 screens per year.<sup>13</sup>

Screeners at Cambridge Breast Unit, United Kingdom, must have read volumes of 5,000 reads per year, 3,000 of which must be first reads.<sup>14</sup>

The majority of Canadian provinces and territories require minimum reading volumes for radiologists of 1,000 reads per year. One screening clinic indicated that they strive for 2,000 reads per year. In British Columbia, the minimum reading volume for radiologists is 2,500 per year.

# 5 Batch Reading

Batch reading is the process of reading multiple screening mammograms at a time, rather than individually or at the same time as diagnostic mammograms. This allows radiologists to better focus on reading and interpreting screening mammograms without interruptions. Studies define batch reading differently. One study indicated that batch reading includes approximately 40 mammograms from a single mammography machine in a single day<sup>17</sup>, while another study reported that mammograms were interpreted in a batch mode within two days of acquisition.<sup>18</sup> Another study states that dedicated batch reading requires an uninterrupted block of time designated to

interpret a group of screening mammograms in succession.<sup>19</sup>

Batch reading requires separate infrastructure that includes a quiet and dark environment to complete reads, which prevents interruptions. The evidence synthesis suggested that batch reading of mammograms can decrease recall rates when compared to immediate (online) non-batch reading.<sup>11</sup>

During the batch reading process, evidence suggests that comparison with two or more prior mammograms may decrease recall rates.<sup>11</sup>

## EXAMPLES

Monash Breast Screening conducts batch off-site readings in dedicated facilities to avoid interruptions and distractions. Reading typically occurs over a two to three hour period, early in the morning.<sup>13</sup>

Batch reading is used in some Canadian provinces, including British Columbia, Alberta, Saskatchewan, Manitoba, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador, but can also vary by clinic within jurisdictions. Radiologists are required to work in a dark and quiet area with no interruptions. One clinic indicated that radiologists typically complete a batch of 100 reads at a time; however, as mammography technology has improved, radiologists reported that this was too many, recommending that 75-80 batch reads is a more appropriate number.\*\*

This clinic indicated that radiologists physically come to a central clinic to do batch reads to ensure that they have dedicated, uninterrupted time to interpret screening mammograms. The radiologist work station is in an enclosed room away from the general clinic areas, to ensure a quiet work space, and is outfitted with black out curtains to ensure as little ambient light as possible.

A majority of provinces and territories compare current mammograms with previous mammograms. One provincial screening program has policies in place to ensure that screening results are not delayed due to comparison with previous mammograms. If comparison mammograms are not received within 12 business days, the screen is reported in their absence.

\*\* Content adapted from interviews with clinicians and screening programs in Canada.

## 6 Double Reading

Double reading is the process of two readers interpreting a given mammogram. Double reading can be completed for all reads, or for only reads that are identified as abnormal by a single reader. The direct impact on ACRs, however, is dependent on the screening program's objective and design of the double reading program. For example, a program designed to double read an abnormal screen with arbitration is intended to increase specificity and decrease ACR. In contrast, double reads of normal screens will impact sensitivity and increase ACR. As such, it is important to clearly define the objectives of a double reading program, based on performance indicators evaluated and areas identified for improvement.

Double reading of mammograms is standard practice in Australia and Europe, but is not in Canada and the United States.<sup>11</sup> Given remuneration, as well as resource constraints in Canada, the application of double reading as standard practice could be applied only to those cases that are being considered for recall.

The evidence synthesis reports that targeted double reading of only potential recalls may decrease recall rates. The synthesis also highlights that recall rates may decrease from the use of double reading with consensus or arbitration.<sup>11,12,20</sup>

**It is important to consider challenges and opportunities for this practice given the increasing use of artificial intelligence (AI) and how this may play a role in the future application of double reading. AI has a great deal of potential to act as a second read, however, it has not been developed for this purpose yet. Breast screening programs need to begin to think about the implications of AI in the future. The Canadian Association of Radiologists will be developing an AI product through 2020-2021, which may be used by programs as they explore this approach.<sup>††</sup>**

### EXAMPLES

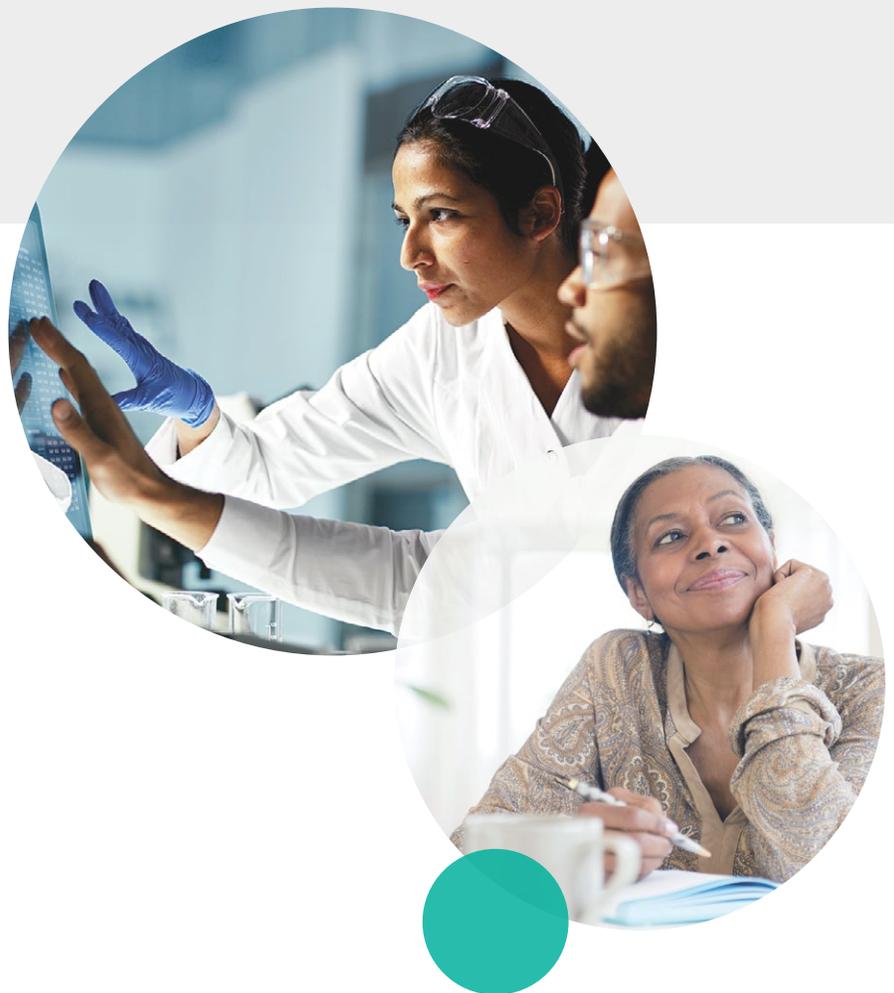
Double reading practices are widely used at Monash Breast Screening. When a difference in opinion occurs between the first and second reader, a single third reader is used for arbitration.<sup>13</sup>

Screening practices at Cambridge Breast Unit, United Kingdom, include independent double reading by film readers in alignment with defined national standards for training, caseloads, and performance. Arbitration is used for cases where there is a discrepancy in the first two readers' opinions.<sup>14</sup>

†† For more information on how AI technologies could be used to improve diagnosis in breast cancer see the Partnership's environmental scan on AI in cancer care <https://www.partnershipagainstcancer.ca/topics/artificial-intelligence-report/>

A few clinics and programs across Canada, including some clinics in the Northwest Territories, Alberta, Saskatchewan, New Brunswick, and Nova Scotia, practice double reading.

- One provincial breast screening centre in Canada reported double reading by a senior mammography technologist (independent blind), followed by a review by a radiologist. This approach leverages the mammogram technologist role to include an initial review of screens to ensure that they are of an appropriate quality, and to complete an initial assessment of whether cancer is detected.
- When differences occur between two readers, one provincial screening program had no third reader, while one program informally went to the chief radiologist for a third review.



## Evidence Informed Approaches Not Included in the Framework

Table 4 details the evidence-informed approaches presented in the evidence synthesis which have not been incorporated into the Framework for Action. These

practices were not included in the Framework for Action because they were not identified as priorities by key partners at a pan-Canadian workshop in June 2019.

**TABLE 4:** SUMMARY OF CURRENT EVIDENCE ON FACTORS POTENTIALLY AFFECTING BREAST CANCER SCREENING ACR

Evidence-Informed Approach	Reason for Not Including
<b>Factors that may decrease recall rates without compromising cancer detection</b>	
<b>Implementation of digital breast tomosynthesis</b>	Mixed opinions were expressed on the implementation of digital breast tomosynthesis. Research shows that the benefit of tomosynthesis varies based on patient characteristics; tomosynthesis may decrease recall rates in general, but may increase rates for specific breast abnormalities. <sup>11</sup> In addition, there is currently very limited understanding of cost-effectiveness.
<b>Fellowship training in breast imaging</b>	Prerequisite fellowship training in breast imaging was not identified as a common practice, though it is used by a few provinces and territories, including Nova Scotia. There is evidence that recall rates of non-fellowship trained radiologists may exceed that of counterparts in first years of practice.
<b>Factors that may merit further consideration by breast cancer screening programs</b>	
<b>Synthesized mammography</b>	Synthesized mammography was not discussed in depth.
<b>Mammographic compression</b>	Breast compression is a basic mandatory technique used by screening programs in Canada. Level of compression was mentioned as a contributor to screen quality. Current trends towards using less compression to decrease patient discomfort was highlighted as a current challenge that Mammogram Technologists are having address.  Please note, technologist performance is not within scope for the Framework for Action, as such, this technique is not discussed further.

## 4.3 Framework for Action: Implementation

The implementation plan in Section 4.3.2 details key approaches to address ACR trends in breast cancer screening, including key considerations, partners, priority, challenges and enablers for implementation.

Financial resources required to implement each initiative will vary by jurisdiction. Any required investment should be considered in the context of savings and improved patient experience through the reduction of unnecessary follow-up testing.

### 4.3.1 Maximizing Impact: Equitable and Sustainable Implementation

As elements of the Framework are explored, it will be important for screening programs and other users of this Framework to consider equity when planning for implementation of quality assurance practices. Such considerations can help to ensure efforts are taken to close existing gaps to deliver high-quality breast screening services. Approaches that can equip radiologists and mammography technologists with tools, training programs and other relevant resource supports to meet mandatory guidelines of quality assurance practices, can enable opportunities for programs to provide high-quality breast screening services in rural and remote clinical settings.

To maximize the impact of quality assurance practices described in this Framework, it is important programs consider equity in funding and allocation of resources to reduce the financial burden across clinics and sustain strategies implemented. This is essential to ensuring that existing gaps to providing equitable access to high-quality breast screening services are minimized.

## 4.3.2 Implementation Plan

# 1. Peer Review and Mentorship

### Implementation Considerations

- 1.1 On a monthly, quarterly, or annual basis, dependent on radiologist performance (i.e., where radiologists' performance is good, conduct on a less frequent basis), bring screening and diagnostic staff together to review all recall cases, with a specific focus on false positive cases

Note: Leverage materials including The CAR Guide To Peer Review Systems<sup>##</sup>

### Required Partners to Implement

Radiologists

Mammography Technologists

Provincial/Territorial Screening Program  
(organized program and/or institution)

Government (provincial and  
territorial funding)

Provincial Association of Radiologists

### Implementation Priority

#### Short Term

#### Key Enablers and Challenges

##### Enablers:

- Convene a pan-Canadian group to champion this initiative
- Mentorship will be most successful if a collaborative and non-threatening setting is fostered
- Case review in a group setting allows for dynamic and informative discussions between the radiologists, and provides an opportunity to learn from each other's experiences
- It is recommended that case reviews are de-identified and conducted as anonymously as possible
- Engaging a local medical advisory committee and chief screener at each site may be valuable
- Including technologists, screening and

diagnostic staff in the review process ensures all elements of the screening pathway are considered, and each staff member is aware of how their role impacts patient outcomes and experience

##### Challenges:

- Group think was noted as a common challenge by some
- Conducting review meetings may be resource intensive as they require administrative staff time to plan and coordinate, as well as radiologist time to attend



<sup>##</sup> Canadian Association of Radiologists. Guides. Available From: <https://car.ca/wp-content/uploads/CAR-Peer-Review.pdf>

## 2. Education

### Implementation Considerations

- 2.1 Develop education programs or symposiums for radiologists with a focus on principles of screening, including minimizing harms and identification of benign disease
- 2.2 Coordinate and disseminate programs across provinces and territories

Note: Leverage Canadian Association of Radiologists learning management system and modules developed within the system

### Required Partners to Implement

Radiologists	Canadian Association of Radiologists
Provincial/Territorial Screening Program (organized program and/or institution)	Canadian Society of Breast Imaging
Provincial Association of Radiologists	Government (provincial and territorial funding)

### Implementation Priority

#### Short Term

#### Key Enablers and Challenges

##### Enablers:

- Convene a pan-Canadian group to reduce potential resource and time constraints, as well as ensure consistency across provinces
- Jurisdictions have reported positive results from the implementation of education initiatives
- One jurisdiction reported that it would be beneficial for radiologists to be provided with common causes for unnecessary recalls, as well as with specific images and instructions on what to look for, so that radiologists can better tell why a case should or should not be recalled

##### Challenges:

- Current culture of breast screening has evolved, continuing to place high value on cancer detection, but with less recognition of overall principles including reducing harms



# 3. Standardized Report Cards

## Implementation Considerations

- 3.1 Implement standardized report cards for all radiologists including a consistent set of measures such as: cancer detection rate, PPV, false positives, reading volumes, and ACR
- 3.2 Based on reporting, give radiologists specific short- and long-term goals to achieve desired rates, and prescription for achieving
- 3.3 Implement mandatory follow-ups with radiologists where performance metrics are sub-optimal to discuss progression towards their goals

## Required Partners to Implement

Radiologists

Provincial Association of Radiologists

Provincial/Territorial Screening Program  
(organized program and/or institution)

Government (provincial and territorial funding)

## Implementation Priority

### Short Term

### Key Enablers and Challenges

#### Enablers:

- Data currently available to programs need to be more timely and up-to-date, to maximize the potential impact
- Feedback provided to radiologists must be accompanied by clear goals and timelines in order to see change
- Jurisdictions have seen success when they have enabled radiologists to see their own performance in comparison to that of the screening centre, province, country, and their peers
- Survey radiologists on the importance and interpretability of various aspects of the reporting package to identify opportunities to improve reporting templates

#### Challenges:

- Cost of implementation may be prohibitive to some jurisdictions
- Motivation and incentivization remains a challenge as some jurisdictions report that radiologists often times do not review their report cards, or consider what they can do to improve based on the metrics reported



# 4. Minimum Reading Volumes

## Implementation Considerations

- 4.1 Strive to achieve ideal annual reading volumes of 2,000 reads per year

## Required Partners to Implement

Radiologists

Provincial Association of Radiologists

Provincial/Territorial Screening Program  
(organized program and/or institution)

Canadian Association of Radiologists

Canadian Society of Breast Imaging



## Implementation Priority

**Immediate**

## Key Enablers and Challenges

### Enablers:

- A Canadian study showed greater gains in overall accuracy by increasing volumes up to 3,000 mammograms per year
- Increasing reading volumes may be more effective when also receiving feedback on cancer outcomes
- Support radiologists with lower volume practices through provision of double reads, conference reads and/or online reads

### Challenges:

- Radiologists practicing in rural areas may experience challenges reaching minimum volumes

# 5. Batch Reading

## Implementation Considerations

- 5.1 Batch reading to become standard practice
- 5.2 Ensure dedicated dark and quiet space is made available to radiologists to complete batch reads
- 5.3 Continue to compare current mammogram with two or more prior mammograms

## Required Partners to Implement

Radiologists	Provincial Association of Radiologists
Provincial/Territorial Screening Program (organized program and/or institution)	Canadian Association of Radiologists
	Canadian Society of Breast Imaging



## Implementation Priority

**Immediate**

## Key Enablers and Challenges

### Enablers:

- With the shift to digital technology, one jurisdiction recommended 75-80 screens per batch, while others read up to 100 screens at a time. It is important to note that batch reading is not about the number of reads conducted at a time, but rather the environmental circumstances under which the radiologists completes them
- Many jurisdictions consider this a standard practice, allowing radiologists to concentrate on a single task and clearly separate their diagnostic and screening reads

### Challenges:

- Batch reading may contribute to reporting and diagnostic wait times, as cases must first accumulate
- Infrastructure may be unable to support all types of previous mammograms (e.g., tomosynthesis) making comparison difficult
- Collecting previous mammograms may be resource-intensive and manual in some cases

# 6. Double Reading (including consensus)

## Implementation Considerations

- 6.1 In the short term, coordinate a nationally supported pilot project to assess targeted double reading of only potential recalls
- 6.2 Over time, assess available technologies which can be leveraged to complete double reading on all screens

## Required Partners to Implement

Radiologists

Mammography Technologists

Provincial/Territorial Screening Program  
(organized program and/or institution)

Canadian Association of Radiologists

Provincial Association of Radiologists

Canadian Society of Breast Imaging



## Implementation Priority

### Short Term

Assess double reading for recalled screens only

### Long Term

Integrate advanced technologies (i.e. Artificial Intelligence) to best support screening

## Key Enablers and Challenges

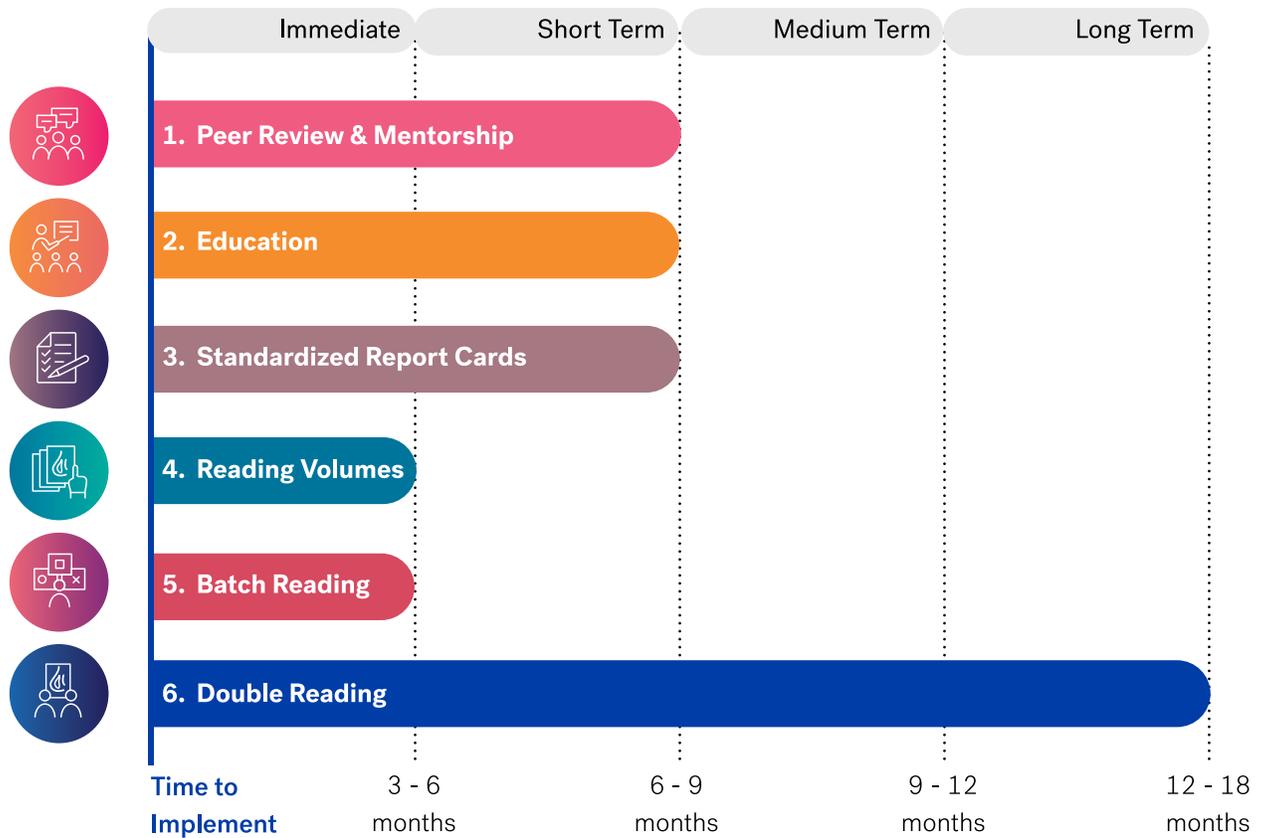
### Challenges:

- Study results vary, with no clear evidence for double reading with consensus or arbitration versus single reading
- The number of radiologists in a jurisdiction can impact the ability to double read, and affect sharing of test results with patients in a timely manner
- Technology is continuously evolving, and current double reading processes may be less relevant in the future

The evidence-informed approaches described in Section 4.3.2 can be implemented over the immediate, short, medium and long term.

Priority of implementation was based on logistical ease, and whether jurisdictions already consider a given approach as standard practice.

**FIGURE 12: FRAMEWORK FOR ACTION IMPLEMENTATION PRIORITY**





Call to  
Action



## 5.0 Call to Action

**This Framework is intended to support the breast screening community and partners with adopting and tailoring strategies described to achieve optimal ACRs. Through continuous quality improvement processes, the benefits of screening could be maximized, while minimizing potential harms to patients and costs to the health care system. The evidence-informed approaches presented show that there are many practical strategies that can positively impact ACRs. The case examples further highlight their feasibility within a Canadian screening setting(s), as well as the opportunity for clinicians and screening programs leaders to collaboratively implement or enhance (scale and spread) these practices.**

Across Canada, a great deal of work has already been completed to support continuous quality improvements of mammography screening within programs. Efforts to advance quality improvements, however, will require ongoing monitoring and evaluation to measure the impact of these interventions. Approaches to optimizing ACRs in the context of advances in screening technology will be important to ensure people continue to receive high quality breast cancer screening services.

As most people screened with mammography will not have cancer, potential physical and psychological harms to patients must be minimized. Screening programs therefore need to deliver accurate screening results to ensure patients do not suffer undue stress or harm from unnecessary follow-up procedures. Screening participant values must also be considered in reviewing the acceptable

balance of ACR benchmark with cancer detection. Programmatic efforts to create a supportive environment that maintains robust quality assurance and improvement practices can enable opportunities to achieve optimal ACRs and improve patient outcomes. This Framework for Action directly supports the [Canadian Strategy for Cancer Control](#), which calls cancer system stakeholders and partners to action to enhance existing screening efforts and deliver quality care in a sustainable manner.

This Framework offers additional value as Canada begins to resume and operate cancer screening services post COVID-19. Planning will need to be done carefully and in an informed manner to ensure screening and diagnostic service capacity are not overwhelmed, and that screening pathways are optimized to reduce health system costs and patient harms from unnecessary follow-up tests.

## 6.0 References

- 1 Canadian Partnership Against Cancer. *Canadian Strategy for Cancer Control 2019-2029* [report]. Toronto, ON: Canadian Partnership Against Cancer; 2019 [cited 2019 Nov 20]. Available from: <https://www.partnershipagaincancer.ca/cancer-strategy/>.
- 2 Statistics Canada. An Update on Mammography Use in Canada [web page]. Statistics Canada [updated 2015 July 19; cited 2019 Nov 20]. Available from: <https://www150.statcan.gc.ca/n1/pub/82-003-x/2009003/article/10873/findings-resultats-eng.htm#a1>.
- 3 Canadian Partnership Against Cancer. *The 2017 Cancer System Performance Report*. Toronto, ON: Canadian Partnership Against Cancer; 2017 Jun. 62 p. [cited 2019 Nov 20]. Available from: <https://www.partnershipagaincancer.ca/topics/2017-cancer-system-performance-report/>.
- 4 Klarenbach S, Sims-Jones N, Lewin G, Singh H, Thériault G, Tonelli M, Doull M, Courage S, Garcia AJ, Thombs BD. Recommendations on screening for breast cancer in women aged 40–74 years who are not at increased risk for breast cancer. *CMAJ: Canadian Medical Association Journal*. 2018 Dec 10;190(49):E1441.
- 5 Canadian Cancer Society. Breast cancer statistics [web page]. Canadian Cancer Society; 2019 [cited 2019 Dec 4]. Available from: <https://www.cancer.ca/en/cancer-information/cancer-type/breast/statistics/?region=on>.
- 6 World Health Organization. Cancer Screening [web page]. World Health Organization; 2019 [cited 2019 Nov 20]. Available from: <https://www.who.int/cancer/prevention/diagnosis-screening/screening/en/>.
- 7 Canadian Partnership Against Cancer. *Breast Cancer Screening in Canada: Monitoring and Evaluation of Quality Indicators - Results Report, January 2011 to December 2012*. Toronto: Canadian Partnership Against Cancer; 2017.
- 8 Canadian Cancer Society. Survival statistics for breast cancer [web page]. Canadian Cancer Society; 2019 [cited 2019 Dec 4]. Available from: <https://www.cancer.ca/en/cancer-information/cancer-type/breast/prognosis-and-survival/survival-statistics/?region=on>.
- 9 Wilson, J. M. G., Jungner, G., & World Health Organization. *Principles and practice of screening for disease*. Geneva, Switzerland: World Health Organization; 1968.
- 10 Centre for Effective Practice, Canadian Partnership Against Cancer. *Abnormal Call Rates for Breast Cancer Screening*. Prepared for the Canadian Partnership Against Cancer. 2019 Mar 31. Available from: <https://www.partnershipagaincancer.ca/wp-content/uploads/2020/07/evidence-review-cep.pdf>.

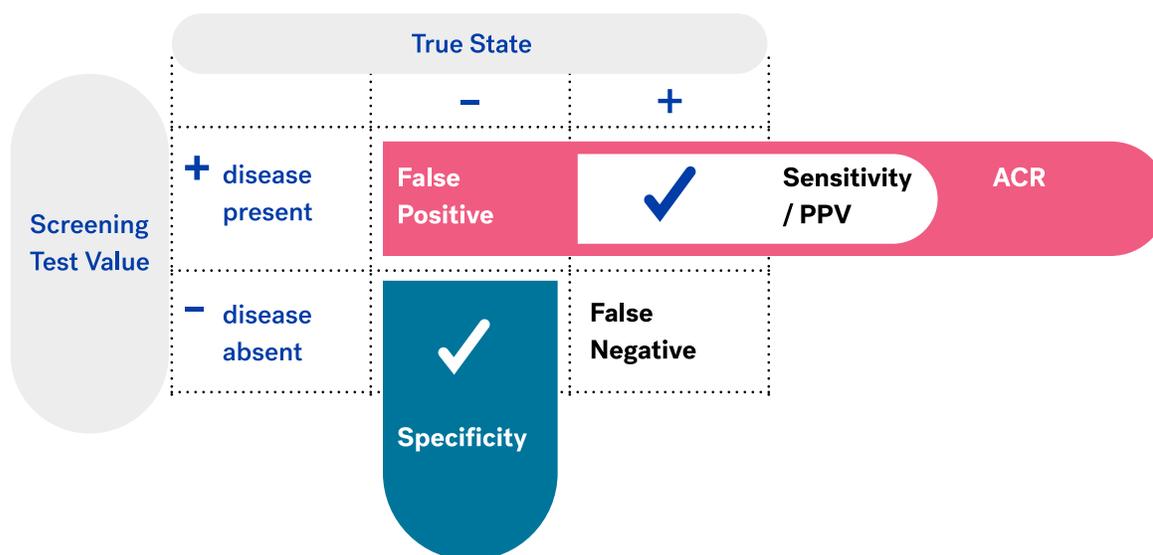
- 11 Research Sciences International, Canadian Partnership Against Cancer. *Evidence Synthesis on Factors Associated with Abnormal Call Rate in Breast Cancer Screening*. Prepared for: Canadian Partnership Against Cancer. 2018 Jun 22. Available from: <https://www.partnershipagainstcancer.ca/wp-content/uploads/2020/07/evidence-review-rsi.pdf>.
- 12 Mullen LA, Panigrahi B, Hollada J, Panigrahi B, Falomo ET, Harvey SC. Strategies for Decreasing Screening Mammography Recall Rates While Maintaining Performance Metrics. *Acad Radiol*. 2017 Dec;24(12):1556-60.
- 13 Waugh, J. Abnormal Call Rates an Australian Perspective. Presented at: the Canadian Partnership Against Cancer Addressing the Trend in Abnormal Call Rate (ACR) in Breast Cancer Screening Workshop. 2019 Jun 20. Halifax, Nova Scotia.
- 14 Wallis, M. NHS Breast Screening Programme: Improving performance by QA. Canadian Partnership Against Cancer. Addressing the Trend in Abnormal Call Rate (ACR) in Breast Cancer Screening Workshop. Pan-Canada workshop hosted by Canadian Partnership Against Cancer. Presentation by John R Waugh, Director of Training, Monash BreastScreen, Melbourne, Victoria. June 2019.
- 15 Coldman AJ, Major D, Doyle GP, D'yachkova Y, Phillips N, Onysko J, Shumak R, Smith NE, Wadden N. Organized breast screening programs in Canada: effect of radiologist reading volumes on outcomes. *Radiology*. 2006 Mar;238(3):809-15.
- 16 Canadian Association of Radiologists. Mammography Accreditation Program (MAP). [Internet]. Ottawa, ON: Canadian Association of Radiologists; 2020. Available from: <https://car.ca/patient-care/map/>.
- 17 Taylor-Phillips, S., Wallis, M. G., Jenkinson, D., Adekanmbi, V., Parsons, H., Dunn, J., et al. (2016). Effect of Using the Same vs Different Order for Second Readings of Screening Mammograms on Rates of Breast Cancer Detection: A Randomized Clinical Trial. *JAMA*, 315(18), 1956-1965.
- 18 Karssemeijer, N., Bluekens, A. M., Beijerinck, D., Deurenberg, J. J., Beekman, M., Visser, R., et al. (2009). Breast cancer screening results 5 years after introduction of digital mammography in a population-based screening program. *Radiology*, 253(2), 353-358.
- 19 Burnside, E. S., Park, J. M., Fine, J. P., & Sisney, G. A. (2005). The use of batch reading to improve the performance of screening mammography. [Research Support, Non-U.S. Gov't]. *AJR. American Journal of Roentgenology*, 185(3), 790- 796.
- 20 Taylor P, Potts HW. Computer aids and human second reading as interventions in screening mammography: two systematic reviews to compare effects on cancer detection and recall rate. *European Journal of Cancer*. 2008 Apr 1;44(6):798-807.

# 7.0 Appendix

## 7.1 Appendix A: Key Terms

### 7.1.1 Quality Measures

**FIGURE 13:** SCREENING RESULTS AND QUALITY MEASURES



Like other tests, screening mammography can yield accurate positive and negative results, as well as false positive and false negative results:<sup>8,9</sup>

- **False Positive:** Normal breast parenchymal perturbations or benign lesions may mimic breast cancer, leading to a diagnosis of cancer when none is present.
- **False Negative:** Cancer may be present in a mammogram but missed.
- **Sensitivity:** Ability of a test to correctly classify an individual as “diseased”.
- **Specificity:** Ability of a test to correctly classify an individual as disease-free.

Key quality measures to consider when assessing effectiveness of breast cancer screening include:<sup>10</sup>

- **Abnormal Call Rate (ACR):** Percentage of mammograms that are identified as abnormal at program screen. The national target for ACR is <10% for initial screens and <5% of subsequent screens.
- **Invasive Cancer Detection Rate (CDR):** Number of invasive cancers detected per 1,000 screens.
- **Positive Predictive Value (PPV):** Percentage of people with a positive screening result who are diagnosed with breast cancer after diagnostic assessment.

8 Discipline of Medical Radiation Sciences, Faculty of Health Sciences, University of Sydney. *Errors in Mammography cannot be Solved Through Technology Alone.* Ekpo, EU., Alakhras, M., and Brennan P. 01/05/2018

9 Understanding and using sensitivity, specificity and predictive values. *NCBI.*

10 *Breast Cancer Screening in Canada. Monitoring & Evaluation of Quality Indicators. Special Topic: Spotlight on Benefits and Harms. January 2011 – December 2012.*

- **Post-Screen Invasive Cancer Rate per 1000, normal or benign screens:** Number of invasive breast cancers found after a normal or benign mammography screening episode within 0 to <12 months and 12–24 months of the screen date, per 1, 000 screens.

Other key terms include:

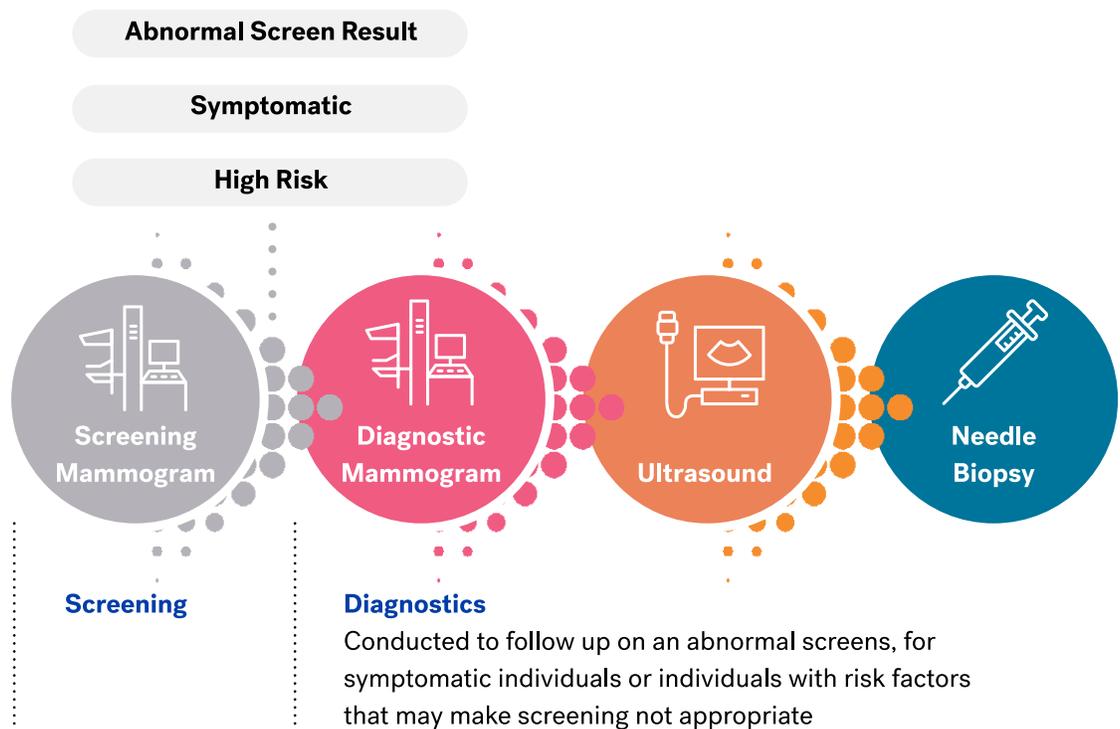
- **Overdiagnosis:** The diagnosis of a medical condition that would never have caused any symptoms or problems.<sup>11</sup>

## 7.1.2 Screening versus Diagnostics

Unlike diagnostics, breast cancer screening is the detection of breast cancer in people who are asymptomatic. Diagnostics,

in contrast, are used after suspicious results during screening or after signs of breast cancer.

**FIGURE 14:** SCREENING VERSUS DIAGNOSTIC MAMMOGRAMS

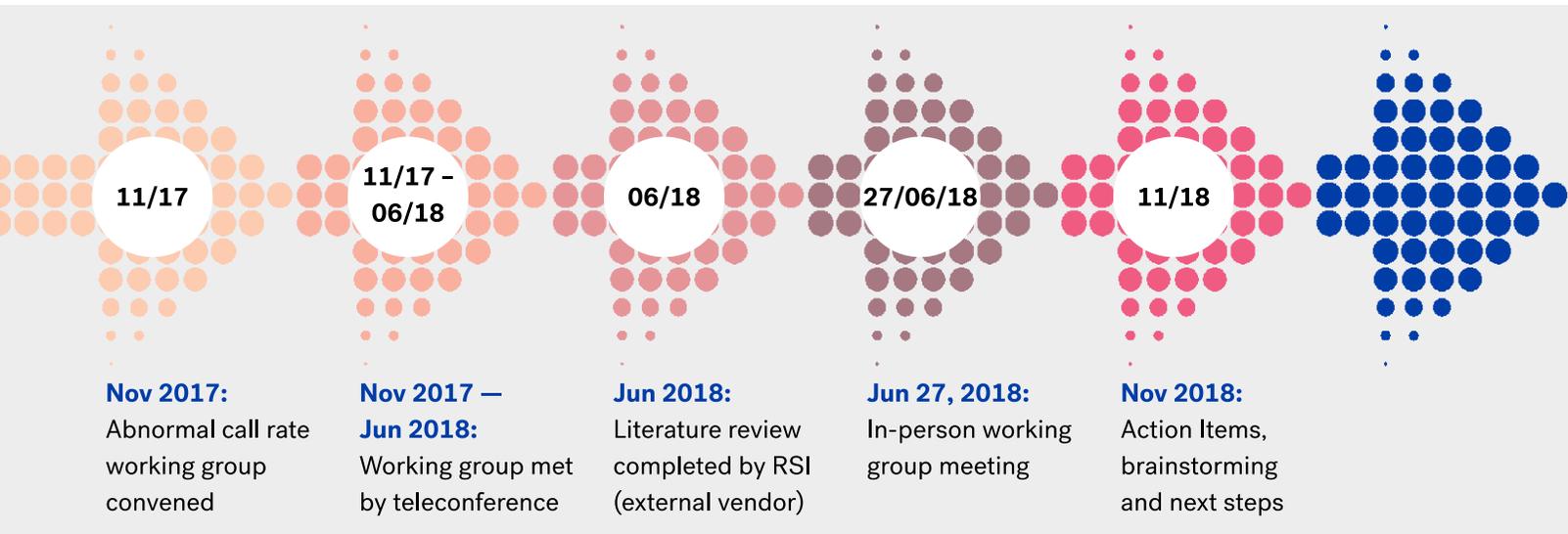


<sup>11</sup> Institute for Quality and Efficiency in Health Care (IQWiG); 2006. <https://www.ncbi.nlm.nih.gov/books/NBK430655/>

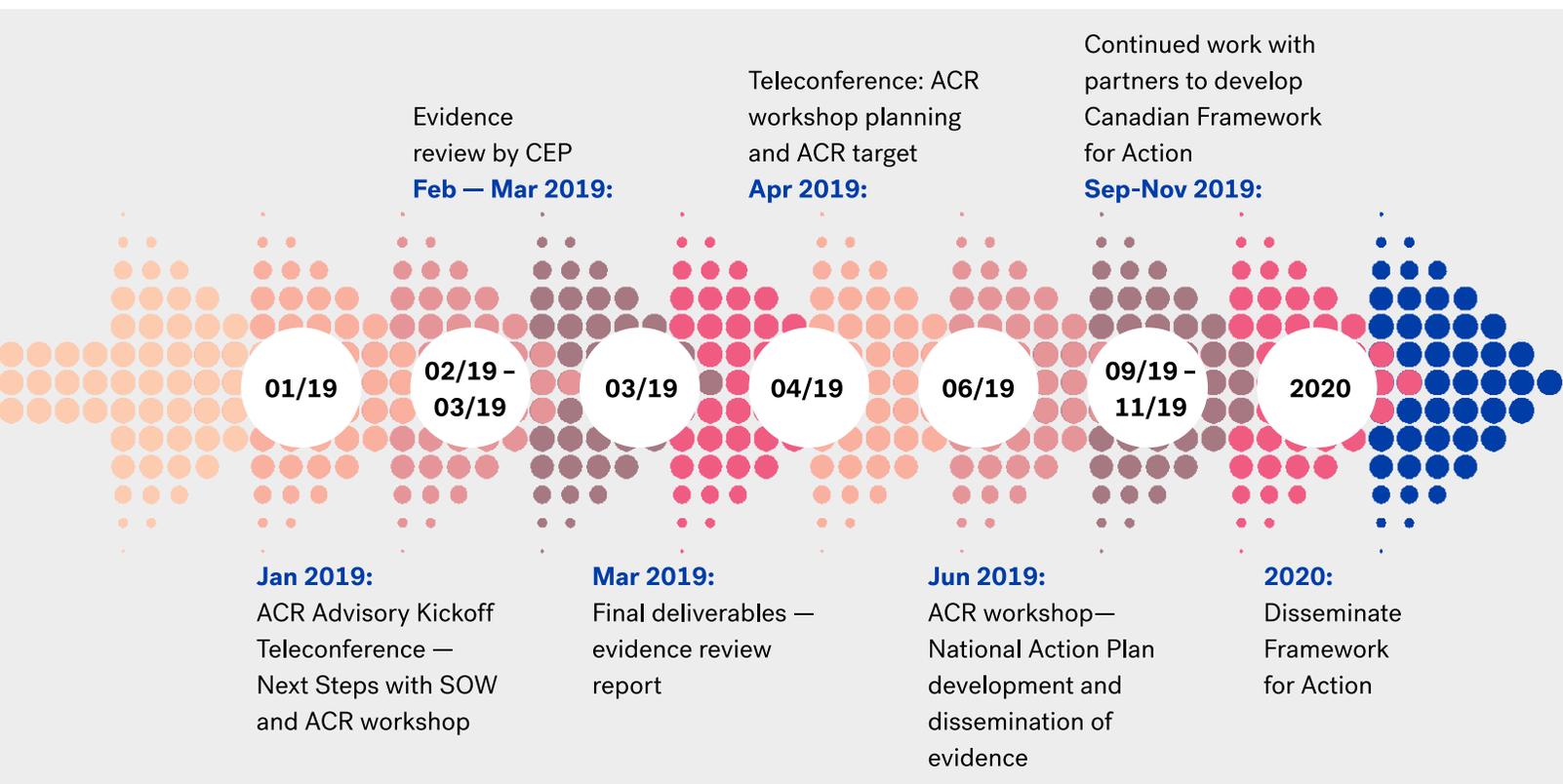
## 7.2 Appendix B: How this Framework was Developed

The Partnership began the process to develop the Framework for Action in November 2017.

**FIGURE 15a:** TIMELINES FOR FRAMEWORK DEVELOPMENT — PHASE 1

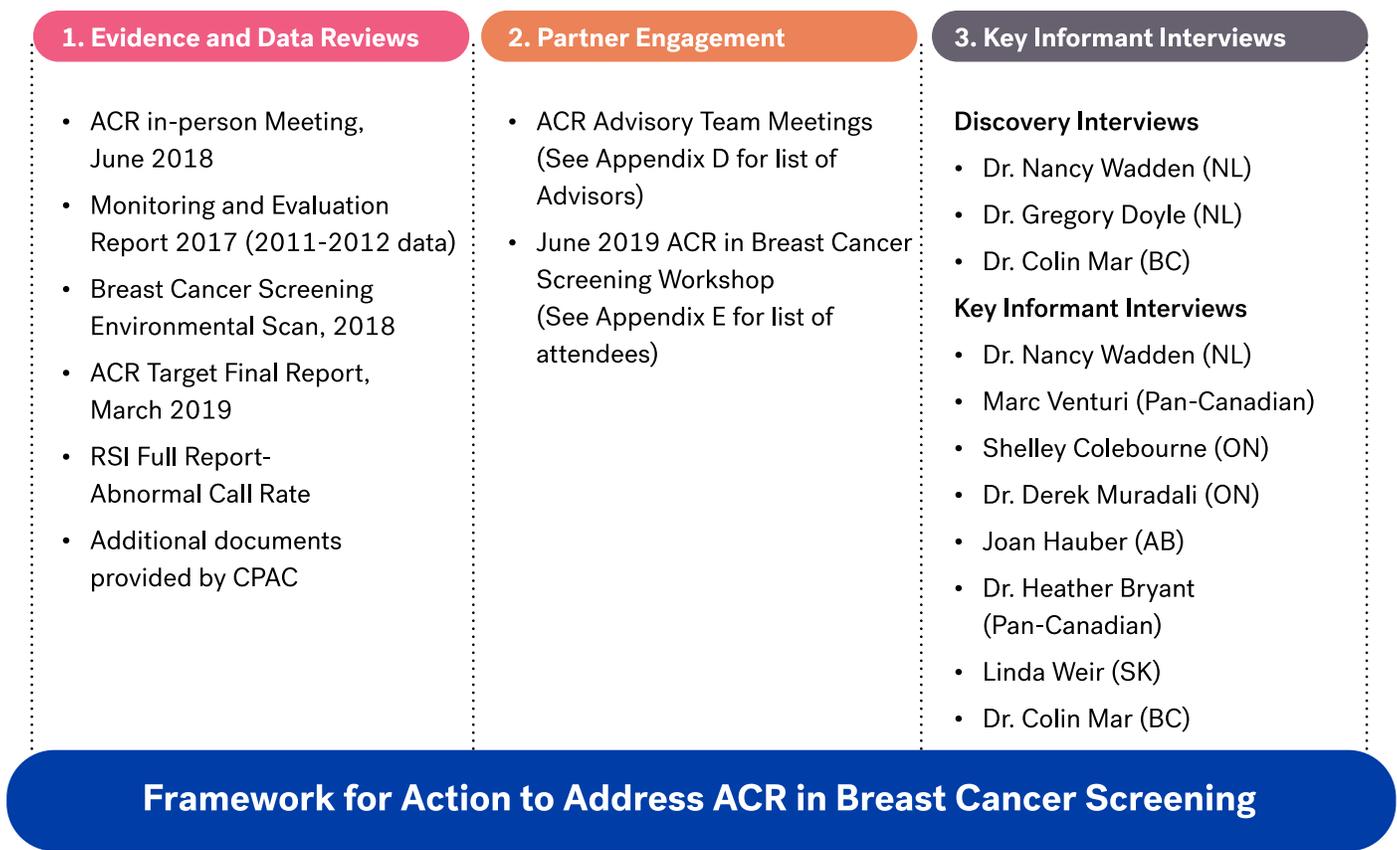


**FIGURE 15b:** TIMELINES FOR FRAMEWORK DEVELOPMENT — PHASE 2

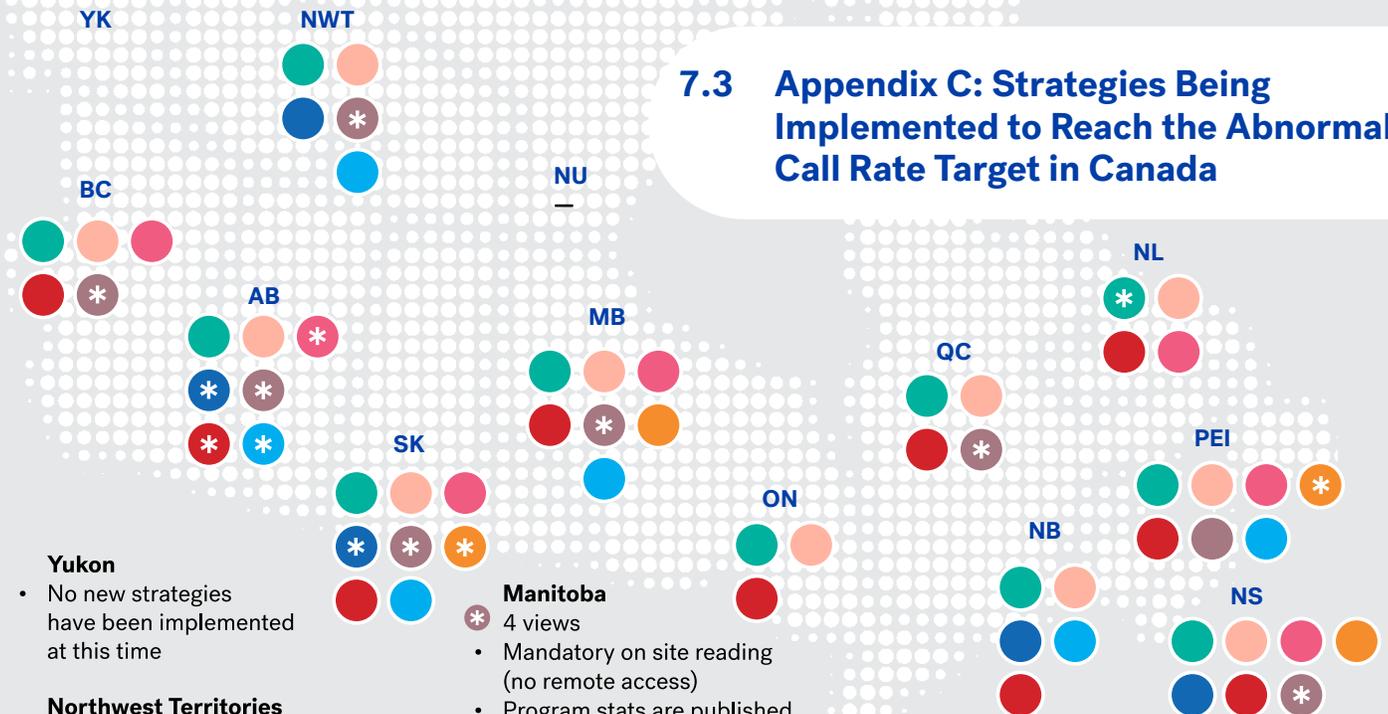


Development of the Framework for Action was informed by comprehensive evidence reviews, key informant interviews, partner engagement, and analysis of qualitative and quantitative data.

**FIGURE 16: FRAMEWORK DEVELOPMENT METHODOLOGY**



## 7.3 Appendix C: Strategies Being Implemented to Reach the Abnormal Call Rate Target in Canada



### Yukon

- No new strategies have been implemented at this time

### Northwest Territories

- 4 views
- Double reading in the process of being implemented. Came about from presentations done at ACR workshop

### British Columbia

- 4 views
- Performance feedback stats modified to highlight areas of opportunity for improvement
- Strategies have been discussed at ACR workshop with varying levels of evidence

### Alberta

- Varies by clinics
- 4 views
- Intend to improve
- Intend to explore
- Varies by clinics
- Uses Technology - tomo
- CPAC helped reinforced the need for these strategies and further the program's work to address issue.

### Saskatchewan

- Tech supervisors only
- 4 views
- Some RADs not all
- Strategies implemented based on CPAC guidance and work

### Manitoba

- 4 views
- Mandatory on site reading (no remote access)
- Program stats are published and distributed monthly
- CPAC helped reinforced the need for these strategies and further the program's work to address issue.
- Practices in place were supported by evidence provided at CPAC meeting. Capacity and or need for 'double reads' being evaluated.

### Ontario

- No notes

### Quebec

- 4 views
- Performance feedback stats modified to highlight areas of opportunity for improvement, working group on ACR, strategies have been discussed at ACR workshop with varying levels of evidence

### New Brunswick

- Network meetings and CAR recommendations

### Nova Scotia

- 4 views
- Unofficial double reads. In Central zone, abnormal mammograms with low degree of suspicion that have been flagged for additional work-up are reviewed by the lead radiologist, to determine if work-up is truly needed.

### Prince Edward Island

- Some RADs, not all
- CPAC helped reinforce performance feedback, comparison reads, minimum reading volumes, and number of mammo views

### Newfoundland and Labrador

- 1500 reading volume
- CPAC helped reinforce minimum reading volume & audit feedback

- Minimum Reading Volume
- Double Reading
- Audit & performance feedback
- Comparisons with prior mammograms
- Number of mammographic views
- Mammographic compression
- Batch reading of mammogram
- Fellowship training in breast imaging
- No organized program

## 7.4 Appendix D: Members of ACR Project and Advisory Teams

Jurisdiction	Name	Title
<b>ACR Project Team</b>		
NL	Gregory Doyle	Chairperson, Canadian Breast Cancer Screening Network
NL	Nancy Wadden	Medical Director, Breast Screening Program, Newfoundland and Labrador
NS	Siân Iles	Medical Advisor - Section Head, Breast Imaging & Nuclear Medicine, Diagnostic Imaging Central Zone
NB	Eshwar Kumar	Co-Chief Executive Officer, Health and Wellness, New Brunswick Department of Health
PEI	Melanie McQuaid	Provincial Medical Director Diagnostic Imaging Queen Elizabeth Hospital, Charlottetown, Prince Edward Island
ON	Derek Muradali	Radiologist-in-Chief, Ontario Breast Screening Program, Ontario Health (Cancer Care Ontario)
ON	Shelley Colebourne	Medical Radiation Technologist, Canadian Association of Medical Radiation Technologists
ON	Rola Shaheen	Provincial Lead, Mammography Quality Management Program; Regional Lead, Breast Imaging- Mississauga Halton Central West Regional Cancer Program
ON	Meghan Walker	Team Lead - Evidence and Program Integration, Cancer Screening, Prevention and Cancer Control, Ontario Health (Cancer Care Ontario) & Assistant Professor, Dalla Lana School of Public Health, University of Toronto
ON	Nancy Lewis	Quality Management Partnership, Project Manager, Mammography
QC	Éric Pelletier	Chef de secteur Unité des politiques de dépistage et de lutte contre les maladies chroniques Direction de l'analyse et de l'évaluation des systèmes de soins et services Institut national de santé publique du Québec
QC	Linda Perron	Institut national de santé publique du Québec
MB	Murray Wilson	Medical Lead Manitoba Breast Check Head Diagnostician CancerCare Manitoba
BC	Janette Sam	Operations Director, Breast Screening, BC Cancer

Jurisdiction	Name	Title
<b>ACR Advisory Team</b>		
NL	Gregory Doyle	Chairperson, Canadian Breast Cancer Screening Network
NL	Nancy Wadden	Medical Director, Breast Screening Program, Newfoundland and Labrador
NL	Connie Hapgood	Radiologist, Breast Screening Program, Newfoundland and Labrador
ON	Derek Muradali	Radiologist-in-Chief, Ontario Breast Screening Program, Cancer Care Ontario
ON	Shelley Colebourne	Medical Radiation Technologist, Canadian Association of Medical Radiation Technologists
BC	Colin Mar	Medical Director, Breast Screening, BC Cancer
AB	Joan Hauber	Manager, Screen Test, Screening Programs, Population, Public and Indigenous Health, Alberta Health Services
SK	Linda Weir	Director, Early Detection, Saskatchewan Cancer Agency
Pan-Canadian	Marc Venturi	Manager of Accreditation and Quality, Canadian Association of Radiologists
Pan-Canadian	Jean Seely	Breast Imaging Section Head, The Ottawa Hospital; President, Canadian Society of Breast Imaging
Pan-Canadian	Heather Bryant	Senior Scientific Lead, Population Health, Canadian Partnership Against Cancer
Pan-Canadian	Erika Nicholson	Director, Screening & Early Detection, Canadian Partnership Against Cancer
Pan-Canadian	Chris Politis	Manager, Screening & Early Detection, Canadian Partnership Against Cancer
Pan-Canadian	Ashleigh Domingo	Analyst, Screening & Early Detection and Knowledge Mobilization Lead, Canadian Partnership Against Cancer

## 7.5 Appendix E: June 2019 Workshop Participants

Province/ Territory	Name	Role	Organization
Alberta	Bonnie Chiang	Manager, Breast Screening	Alberta Health Services
Alberta	Joan Hauber	Manager, Screen Test	Alberta Health Services
Alberta	Chris Molnar	Vice President	Alberta Society of Radiologists
Alberta	Huiming Yang	Provincial Medical Officer of Health, Healthy Living	Alberta Health Services
British Columbia	Carolyn Rudden	Director, Medical Imaging Strategy	BC Ministry of Health
British Columbia	Tammy Clark	Supervisor, Breast Imaging	Victoria General Hospital
British Columbia	Marie-Josée Cloutier	Breast Radiologist	BC Cancer VCC
British Columbia	Colin Mar	Medical Director, Breast Screening Program	BC Cancer
British Columbia	Janette Sam	Operations Director, Breast Screening Program	BC Cancer
Manitoba	Laura Coulter	Program Manager, ColonCheck	CancerCare Manitoba
Manitoba	Keith Sutherland	Manager, Breast Check Operations	Cancer Care Manitoba
Manitoba	Leanne Treloar	Director	Shared Health Manitoba
Newfoundland and Labrador	Gregory Doyle	Program Manager, Breast Screening Program	Eastern Health
Newfoundland and Labrador	Connie Hapgood	Radiologist, Breast Screening Program	Eastern Health
Newfoundland and Labrador	Ed Mercer	Radiologist, Regional Breast Screening	Western Memorial Regional Hospital
Newfoundland and Labrador	Janette Templeton	Director, Cancer Care	Eastern Health
New Brunswick	Christine Cyr	Manager, Medical Imaging	Vitalité Health Network
New Brunswick	Heidi King	Radiologist, Horizon Health Network	NB Medical Society
New Brunswick	Eshwar Kumar	Co-Chief Executive Officer, Health and Wellness	New Brunswick Department of Health
New Brunswick	Betty LeBlanc	Director, Diagnostic Imaging, Dr. Everett Chalmers Hospital	Horizon Health Network
New Brunswick	Nathalie L'Italian-Bourgeois	Nurse Manager, Breast Health Centre	Vitalité Health Network

Province/ Territory	Name	Role	Organization
New Brunswick	Daryl Steeves	Regional Administrative Director	Horizon Health Network
Northwest Territories	Giselle English	Program Coordinator, Breast Screening Program	Northwest Territories Health and Social Services Authority
Northwest Territories	Kami Kandola	Deputy Chief Public Health Officer, Department of Health and Social Services	GNWT Health and Social Services
Northwest Territories	David Moore	Territorial Manager, Laboratory and Diagnostic Clinical Integration, Health Services	Northwest Territories Health and Social Services Authority
Nova Scotia	Sian Iles	Medical Advisor - Section Head, Breast Imaging & Nuclear Medicine, Diagnostic Imaging Central Zone	Nova Scotia Breast Screening Program
Nova Scotia	Beth Furey	Radiologist, Diagnostic Imaging	Yarmouth Regional Hospital
Nova Scotia	Susan MacKenzie	Team Lead, Breast Imaging Department	IWK Health Centre
Nova Scotia	Trena Metcalfe	Program Manager	Nova Scotia Breast Screening Program
Nova Scotia	Jennifer Payne	Associate Professor, Diagnostic Radiology	Dalhousie University
Nunavut	Stephen Jackson	Territorial Director, Home Community, and Continuing Care	Nunavut Department of Health
Nunavut	Sarah MacRury	Public Health Nurse Consultant	Government of Nunavut
Ontario	Shelley Colebourne	Medical Radiation Technologist	Canadian Association of medical Radiation Technologists
Ontario	Joan Glazier	Lead Medical Radiation Technologist	Cancer Care Ontario
Ontario	Marissa Mendelsohn	Project Manager, Quality Management Mammography	CancerCare Ontario
Ontario	Derek Muradali	Radiologist in Chief, Ontario Breast Screening Program	Cancer Care Ontario
Ontario	Jean Seely	Breast Imaging Section Head	The Ottawa Hospital
Ontario	Rola Shaheen	Provincial Lead	Cancer Care Ontario
Ontario	Bronwen McCurdy	Group Manager	Cancer Care Ontario
Ontario	Jennette Toews	Senior Manager, Surveillance and Epidemiology	Public Health Agency of Canada

Province/ Territory	Name	Role	Organization
Ontario	Marc Venturi	Manager, Accreditation and Quality	Canadian Association of Radiologist
Prince Edward Island	Linda MacMillan	Provincial Breast Screening Coordinator	Health PEI
Prince Edward Island	Melanie McQuaid	Radiologist & Medical Director	PEI Department of Health and Wellness
Quebec	Julie David	Radiologist	Léger et Associés radiologistes
Quebec	Laurence Eloy	Médecin-conseil, Programme québécois de dépistage du cancer du sein	Direction de santé publique
Quebec	Linda Perron	Medical consultant & Epidemiologist	Institut national de santé publique du Québec
Quebec	Marie-Claude Theriault	Chief Radiologist	CISSS de la Gaspésie
Saskatchewan	Karen Efthimiou	Director, Early Detection	Saskatchewan Cancer Agency
Saskatchewan	Carolyn Flegg	Radiologist and Medical Director, Screening & Diagnostic Mammograms	University of Saskatchewan Irene and Les Dubé Centre of Care, Saskatoon City Hospital
Saskatchewan	Cathie Harper	Medical Radiation Technology Working Supervisor, Pasqua Hospital	Saskatchewan Health Authority
Saskatchewan	Patti Shirkey	Director, Diagnostic and Infection Control Services	Saskatchewan Health Authority
Saskatchewan	Linda Weir	Business Lead, Breast Pathway	Saskatchewan Cancer Agency

Chair	Name	Role	Organization
Chair	Nancy Wadden	Medical Director, Breast Screening Program	Eastern Health

Speakers	Name	Role	Organization
Keynote	John Waugh	Consultant Radiologist	Breastscreen Victoria, Australia
Keynote	Matthew Wallis	Consultant Radiologist	Cambridge University Hospitals, United Kingdom

Guest	Name	Role	Organization
Ontario	Lindsay Martin	ACR Action Plan Writer	Optimus SBR

## 7.6 Appendix F: Canadian Partnership Against Cancer Team

Canadian Partnership Against Cancer	
Team	Name
Senior Scientific Lead, Population Health	Heather Bryant
Director, Screening & Early Detection	Erika Nicholson
Manager, Screening & Early Detection	Chris Politis
Manager, Screening & Early Detection	Caitlyn Timmings
Specialist, Screening & Early Detection	Nicolette Baines
Analyst, Screening & Early Detection	Ashleigh Domingo
Analyst, Screening & Early Detection	Zahra Sayyed
Analyst, Screening & Early Detection	Selina Costa
Coordinator, Screening & Early Detection	Susete Pacheco
Coordinator, Screening & Early Detection	Josie Bento
Administrative Assistant, Screening & Early Detection	Kate Crabb
Manager, Analytics & Data Integration, Biostatistician	Sharon Fung
Director, Diagnosis and Clinical Care	Corinne Daly

## 7.7 Appendix G: Sample Cancer Screening Report Cards

Please refer to an anonymized radiologist report card below.

- [Saskatchewan Cancer Agency Report Card](#)
- [Alberta Breast Cancer Screening Program Report Card](#)
- [Newfoundland and Labrador Breast Screening Program Report Card](#)
- [British Columbia Cancer Screening Program Report Card](#)