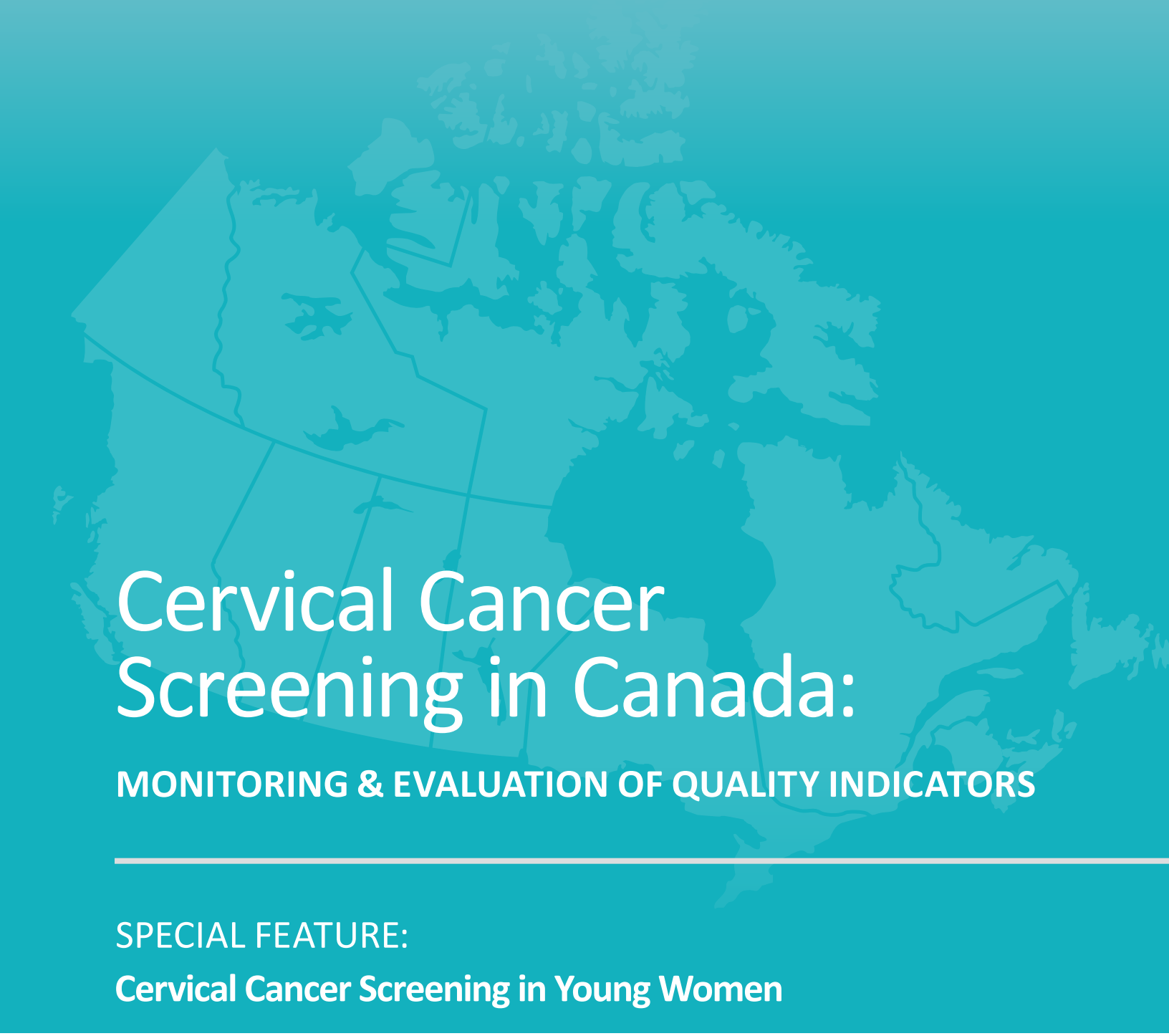

Cervical Cancer Screening in Canada:

MONITORING & EVALUATION OF QUALITY INDICATORS

SPECIAL FEATURE:

Cervical Cancer Screening in Young Women

RESULTS REPORT
JANUARY 2011 – DECEMBER 2013

CANADIAN PARTNERSHIP AGAINST CANCER
PARTENARIAT CANADIEN CONTRE LE CANCER

Cervical Cancer Screening in Canada

Updated July 2016

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Table of Contents

LIST OF FIGURES

LIST OF TABLES

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Executive Summary

Cervical Cancer Screening in Canada, is the third report measuring cervical cancer screening across Canada created by the Pan Canadian Cervical Screening Network (PCCSN). The PCCSN is a strategic initiative of the Canadian Partnership Against Cancer and serves as a national forum to discuss and take action on matters related to cervical cancer screening programs and their integration with HPV testing and vaccination initiatives. The report includes information about screening coverage, follow-up, the quality of screening, pre-cancer and cancer detection, and disease extent at diagnosis for women 21 to 69 years of age for the years 2011 to 2013. Since the level of program organization varies across the country, the information in this report is limited to provinces with available data.

Overall, cervical cancer screening participation measured using data from ten provinces and territories from January 1, 2010 to June 30, 2013 ranged from 63% to 71% when not corrected for prior hysterectomy and from 65% to 74% when corrected for hysterectomy. This falls short of the target of ≥80%. Participation uncorrected for hysterectomy appears to underestimate screening rates particularly for older women. This highlights the importance of correcting for hysterectomy when calculating cervical cancer screening participation rates.

Twelve provinces and territories provided data about the unsatisfactory specimen rate. The target for the unsatisfactory specimen rate (0.5% to 2%) was met by most provinces that used conventional cytology (0.7% to 5.0%) and all provinces that used liquid-based cytology (0.2% to 1.4%).

The cytology turnaround time or the time between the date the Pap test is performed to the date the Pap test is processed varied greatly by the six provinces that provided data from 22.7% to 96.1% in 2013. The target of 90% within 14 calendar days was reached by two provinces. Time to colposcopy or the time from a high-grade Pap test report to a colposcopy was available for five provinces. Time to colposcopy ranged from 19.2% to 31.1%. No province or territory reached the target of 90% within six weeks for this performance measure.

Six provinces provided information on cytology-histology agreement or the percentage of high-grade abnormal Pap tests with histological work-up found to have a pre-cancerous lesion or an invasive cancer in the following 12 months. The agreement between screening cytology and histology is a measure of the positive predictive value of the Pap test and the accuracy of colposcopy assessment and biopsy interpretation. The cytology histology agreement for women who had a high grade or more severe Pap test result ranged from 47.5% to 79.4%. The target of ≥ 65% was exceeded in four provinces.

The age-standardized invasive cervical cancer incidence rate in the nine provinces that provided data ranged from 8.8 per 100,000 women to 12.1 per 100,000 women. The goal by 2037 is 5.5 cases per 100,000 women based on 80% screening participation and 70% immunization.

Finally, updated cervical cancer screening guidelines have been recently introduced by the Canadian Task Force on Preventive Health Care as well as by most provinces. The Task Force guidelines no longer recommend screening women less than 25 years of age and most provincial/territorial guidelines do not recommend screening for women less than 21 years of age. In order to provide baseline data about young women, this report presents the percentage of women 18 to 20 years of age who had a Pap test from January 1, 2010, to June 30, 2013 for nine provinces and territories. Overall, 58.8% of the female population 18 to 20 years of age (49.3% to 89.7%) had a Pap test during this time period.

About the Canadian Partnership Against Cancer

The Canadian Partnership Against Cancer (the Partnership) was created in 2007 by the federal government with funding through Health Canada. Since then, our primary mandate has been to move Canada's cancer control strategy into action and to help it succeed through coordinated system-level change across the full cancer care continuum – from prevention and treatment through survivorship and palliative care.

The Partnership achieves outcomes by working closely with national, provincial, and territorial partners. This collaboration stimulates and supports the generation of knowledge about cancer and cancer control and promotes the exchange and uptake of best practices across the country to help those most affected by cancer. The outcomes we work towards include fewer cases of cancer, fewer Canadians dying from cancer, and a better quality of life for those affected by cancer.

About the Pan-Canadian Cervical Cancer Screening Network

The Pan-Canadian Cervical Screening Network (PCCSN) is a strategic initiative of the Canadian Partnership Against Cancer under the Screening Advisory Group. The PCCSN serves as a national forum to discuss and take action on matters related to cervical cancer screening programs and their integration with HPV testing and vaccination initiatives.

The network includes key stakeholders from across Canada, with representation from each province and territory in cervical cancer screening programs and policy, the College of Family Physicians of Canada, the Society of Obstetrics and Gynaecologists, the Canadian Society of Cytology, the Public Health Agency of Canada, the Canadian Cancer Society, and the Screening Advisory Group.

The goal of the PCCSN is to collaboratively foster and evaluate effective cervical cancer screening programs in Canada, optimize participation in cervical cancer screening, identify, review, develop and harmonize policy and guidelines for cervical screening practice, as well as facilitate communication of key messages in cervical cancer control in Canada.

About this Report

Why Report on Cervical Cancer Screening?

Screening is the systematic application of a test to identify asymptomatic individuals at risk of a disease who will benefit from further investigation or preventive action.[1] The goal of cancer screening is to detect pre-cancerous lesions or early stage cancer thereby improving the likelihood of successful treatment and reducing disease incidence and mortality.[2] The introduction of cervical cancer screening using the Papanicolaou test (Pap test) has led to significant reductions in cervical cancer incidence and mortality in Canada. From 1977 to 2015, the incidence of invasive cervical cancer declined from 15.4 per 100,000 to an estimated 7.5 per 100,000 and invasive cervical cancer mortality declined from 4.8 per 100,000 to an estimated 1.6 per 100,000.[3] Despite this success, in 2015, an estimated 1,500 Canadian women will be diagnosed with invasive cervical cancer and 380 will die from the disease.[3] Many of these women were not screened in the five years before their diagnosis, were not followed up appropriately after an abnormal Pap test result, or the Pap test failed to detect their cancer. Additionally, we know that women with lower levels of income, education, new immigrants, women living in rural or remote locations, and who have limited access to screening are less likely to be screened.[4] For these reasons, it is critical to continuously monitor and evaluate cervical cancer screening to ensure that Canadian women receive high-quality cancer prevention services.

What Causes Cervical Cancer?

Cervical cancer is caused by infection with the human papillomavirus (HPV).[5, 6] Of the more than 100 types of identified HPV, 40 infect the genital tract; of these, approximately 15 are considered high risk, with types 16 and 18 causally linked to 70% of cervical cancer cases. HPV is a highly prevalent sexually transmitted virus; peak prevalence occurs during adolescence and the early 20s after the commencement of sexual activity.

Most HPV infections are transient and are cleared by the immune system without signs or symptoms. However, a small percentage of women experience persistent infections. For these women, the average time between becoming infected with a high risk HPV type and developing a pre-cancerous lesion is 24 months, with a further eight to 12 years before the development of invasive cervical cancer. Because of this long latency period, screening is an effective strategy for the identification and treatment of pre-cancerous cervical lesions.

How is Cervical Cancer Screening Delivered in Canada?

In Canada, cervical screening has typically occurred opportunistically; however, organized screening programs, which provide the components required to effectively reduce the burden of cervical cancer and permit the evaluation of screening effectiveness, are becoming more developed across the country. Appendix A provides an overview of cervical cancer screening by province and territory. All provinces and territories recommend that cervical cancer screening start at age 21, continue until age 65 to 70, and occur every two to three years. In 2013,

the Canadian Task Force on Preventive Health Care updated its guidelines and now recommends routine screening every three years for women 25 to 69 years of age.[7]

Appendix B illustrates the cervical cancer screening process. Eligible women are given a Pap test by their health-care provider and the sample cells are then processed by a laboratory. The Pap test screens for abnormal changes in cervical cells. A sample of cervical cells is smeared on a slide (conventional cytology) or placed in a liquid fixative (liquid-based cytology — LBC) and screened for squamous or glandular pre-cancerous changes. These changes are classified on a scale of increasing severity using standardized terminology. In Canada, the most common classification system used is the 2001 Bethesda System.[8]

Women who have an abnormal Pap test result are referred for further testing depending on the severity of the abnormality. In some provinces, an HPV test (reflex testing) is used after an abnormal Pap test to determine the appropriate type of follow-up. Although guidelines vary slightly, the Pap test is usually repeated in six months for low-grade abnormalities. For high-grade abnormalities, the woman is referred for colposcopy, during which a detailed examination of the cervix is performed. In some cases, a biopsy is conducted to confirm the nature of the changes and the lesion is treated by local excision, laser ablation, or conization.

How was this Report Informed?

In 2010, the PCCSN established a Monitoring and Evaluation Working Group that included Network representatives from across Canada to develop a process for monitoring cervical cancer screening nationwide. The responsibilities of the group include developing and updating screening performance measures and producing a comprehensive report that describes cervical cancer screening in Canada.

Two reports have been completed; the first report included data from 2006–08 and the second report included data from 2009–11. This current report includes updated performance measures and targets for women screened from 2011 to 2013 (see Appendix C for detailed definitions) as well as a special section that focuses on screening in women 18 to 20 years of age.

In order to create this report, The Partnership's analytics team created aggregate data submission templates which were reviewed and tested by the provinces and territories to standardize the data submission. Aggregate, non-identifiable data were submitted to the Partnership by cervical cancer screening programs across Canada. Not every province was able to submit data for all indicators for numerous reasons including data unavailability and incompleteness, human resource issues, and lack of information system capacity and technical resources. However, all provinces and territories were kept informed of the process regardless of whether they were able to submit data. The Partnership's analytics team then created summary tables and figures that were reviewed and approved by the provincial and territorial cervical screening programs.

How is this Report Organized?

Results are presented for each program performance measure for women 21 to 69 years of age for the years 2011 to 2013. The level of program organization varies across the country; therefore, the information in this report is limited to provinces with available data. Performance measure variability among provinces is due to a variety of factors including the degree of program organization, characteristics of the target population, service access and provision, reporting thresholds for test results, availability of follow-up, and treatment information. This report focuses on the results for each performance measure but does not analyze in detail the specific reasons for variability across Canada. Finally, the new cervical cancer screening guidelines that have been introduced in most provinces over the previous few years no longer recommend screening women less than 21 years of age. Therefore, in order to provide baseline data and examine screening in young women over time, this report includes a special section that focuses on screening in women 18 to 20 years of age at the start of or just prior to the guideline changes.

Participation

What are we Measuring and Why?

Participation is the percentage of eligible women who had at least one Pap test in a three-year period (plus six months). Measuring screening participation is important since women who are not screened at the recommended interval or who have never been screened have a higher risk of developing cervical cancer and are more frequently diagnosed at an advanced stage.[9-11] Participation should be corrected for hysterectomy by removing women from the numerator that had a Pap test after a hysterectomy and by removing women from the denominator who have had a hysterectomy.

Target: *≥80% of women 21 to 69 years of age should be screened in the previous 42 months (three years plus six months).*

What are the Results?

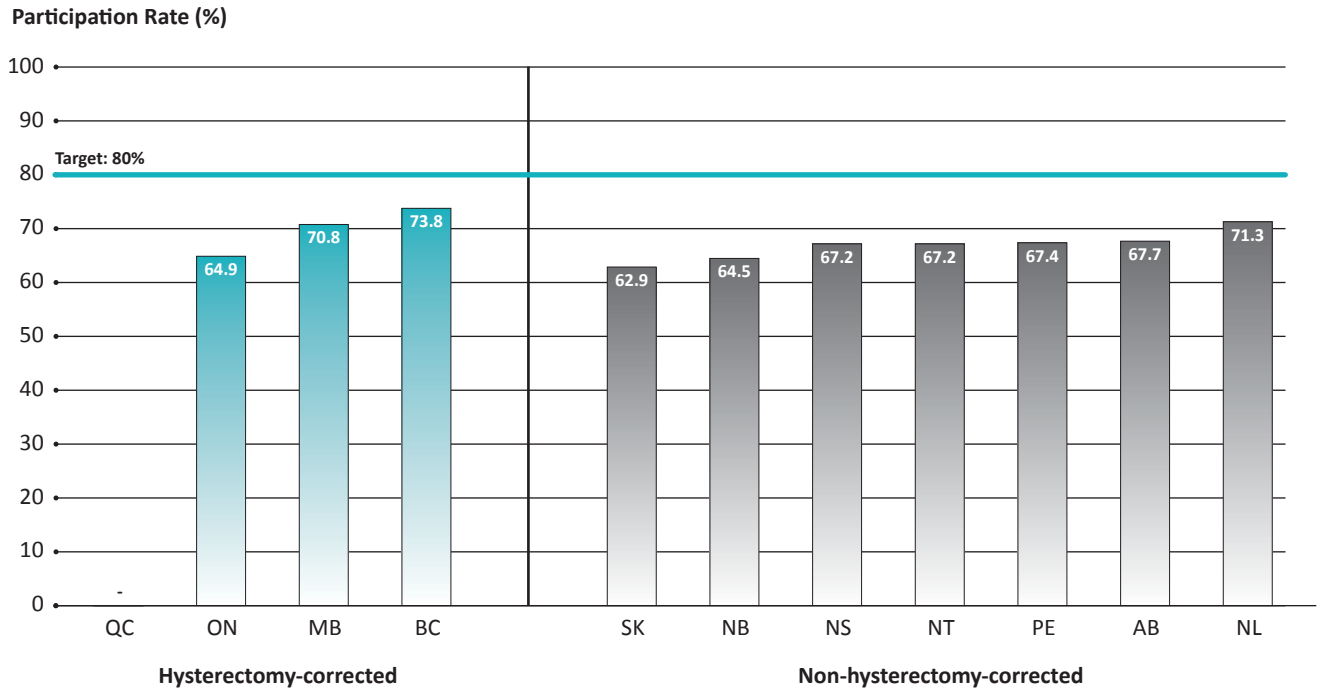
From January 1, 2010 to June 30, 2013, cervical cancer screening participation for women 21 to 69 years of age uncorrected for a previous hysterectomy ranged from 62.9% in Saskatchewan to 71.3% in Newfoundland and Labrador (Figure 1). Participation rates excluding women who have had a hysterectomy were available for British Columbia (73.8%), Manitoba (70.8%), and Ontario (64.9%). To correct for hysterectomy, British Columbia excluded all non-cervical cytology tests (i.e., vaginal vault tests) from the numerator and adjusted the denominator based on Canadian Community Health Survey (CCHS) 2008 data. Manitoba used administrative data to identify women who had a prior hysterectomy and removed Pap tests that occurred after a hysterectomy from the numerator and denominator. Ontario also used administrative data to identify and remove women who had a prior hysterectomy from the numerator and denominator.

Participation corrected for hysterectomy was highest for women 40 to 49 years of age (77.2%) and lowest for women 60 to 69 years of age (63.7%) (Figure 2). When not corrected for hysterectomy, participation varied more by age group and was highest for women 25 to 29 years of age (79.9%) and then decreased with age to 47.6% for women 60 to 69 years of age.

Cervical cancer screening participation has remained fairly stable from 2004-2006 to 2010-2012 (see table 4, Appendix D).

FIGURE 1

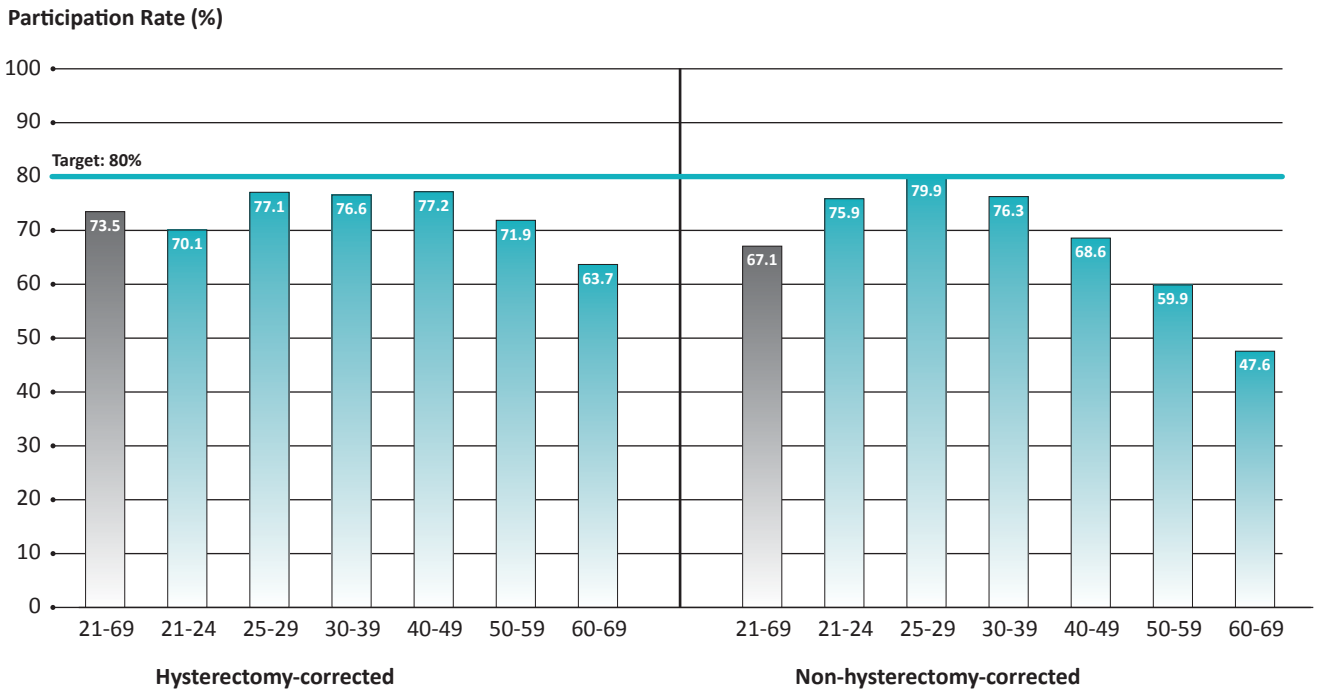
Age-standardized percentage of women 21 to 69 years of age who had at least one Pap test from January 1, 2010 to June 30, 2013 (42-month period) by province and territory



"-" Data were not available for Québec. New Brunswick and Ontario include data from January 2011 to June 2014. Age standardized to the 2011 Canadian population.

FIGURE 2

Percentage of women who had at least one Pap test from January 1, 2010 to June 30, 2013 (42-month period) by age group by hysterectomy correction, provinces and territories combined



Hysterectomy-corrected includes Manitoba and British Columbia. Non-hysterectomy-corrected includes Alberta, Saskatchewan, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador and Northwest Territories. Ontario did not provide data by age group.

What do the Results Mean?

Cervical cancer screening participation is fairly high across Canada but does not meet the target of ≥ 80%. Notably, when corrected for hysterectomy, the participation rate among older women increased significantly. Therefore, uncorrected hysterectomy rates should not be used to inform targeted initiatives or public health policy. Hysterectomy correction when calculating cervical cancer screening participation rates is an important data quality issue that should be addressed by provinces and territories.

Participation also appears to be decreasing slightly over time. We know that women with lower levels of income, education, new immigrants, and women living in rural or remote locations are less likely to be screened.[4] Reasons for women not being screened include a lack of knowledge about screening, believing screening unnecessary or of no benefit, considering one not to be at risk of developing cervical cancer, and fear of embarrassment or pain.[12] These reasons are often related to socio-economic status (education and income), ethnicity, age, health status, and access to the health care system.[11, 13-17]

In order to increase screening participation, a variety of strategies have been implemented at the individual, provider, and system levels. Individual-level interventions include targeted invitation letters and education.[18] Provider-level interventions include improved access to Pap test clinics and more efficient follow-up processes.

The most important system-level strategy used to date is the provision of population-based organized screening instead of opportunistic screening. Population-based organized screening tends to maximize population coverage, minimize the harms of screening by inviting and reminding women to be screened based on a longer screening interval, and is more cost-effective and efficient.[19, 20] In contrast, opportunistic screening leads to the high coverage of younger women who have a low risk of cervical cancer and the low coverage of older, hard-to-reach, and socio-economically disadvantaged women who have a higher risk of cervical cancer.[21]

Currently, organized cervical cancer screening programs exist in most Canadian provinces. Québec has provincial guidelines for cervical cancer screening and Prince Edward Island provides province-wide access to opportunistic screening. It is also clear that participation rates should be corrected for hysterectomy status; participation for older women appears to be underestimated when hysterectomy data is not taken into consideration.

Retention

What are we Measuring and Why?

Retention is the percentage of eligible women who are re-screened within 42 months after a negative Pap test. Retention reflects continued participation in screening which is necessary to achieve optimal screening benefits. In addition to a woman's satisfaction with the screening process, many of the factors related to participation are also related to retention.

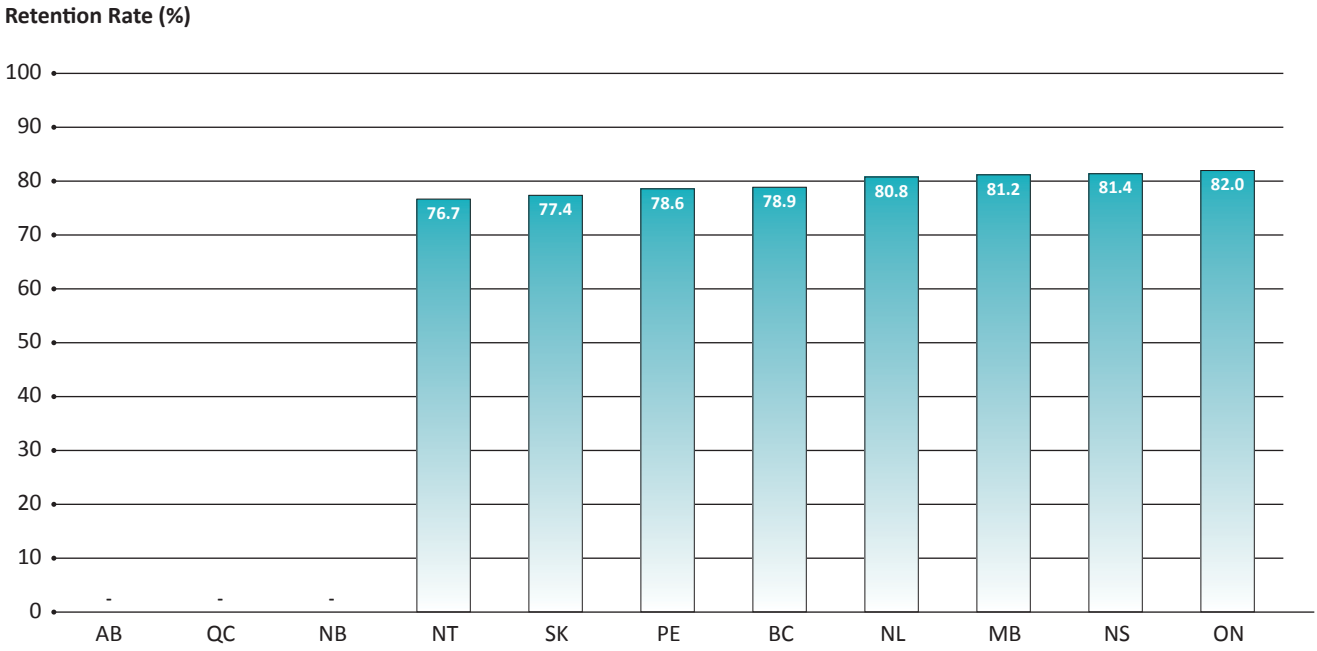
Target: *Not yet determined.*

What are the Results?

The retention rate for women 21 to 66 years of age who had a negative Pap test in 2009-10 ranged from 76.7% in the Northwest Territories to 82.0% in Ontario (Figure 3). Retention was highest for women 21 to 29 years of age, remained consistent for women 30 to 59 years of age, and decreased slightly for women 60 to 66 years of age (Figure 4). The slightly lower retention among women 60 to 66 years of age may reflect the decision to discontinue screening or the prevalence of hysterectomy.

FIGURE 3

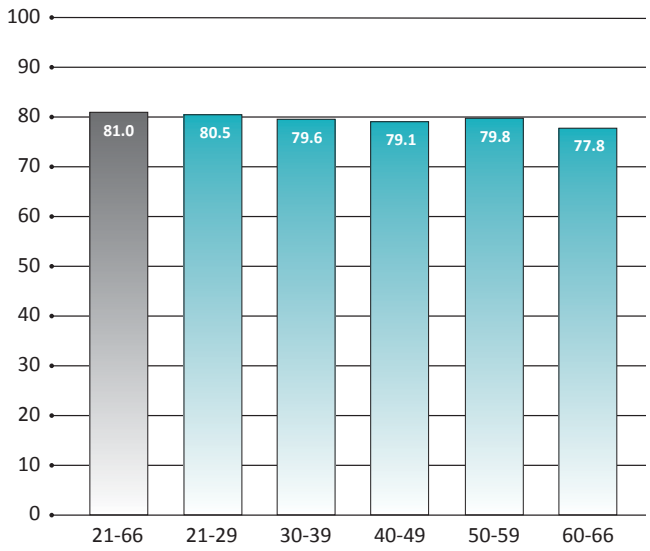
Percentage of women 21 to 66 years of age who had a subsequent Pap test within 42-months of a negative Pap test by province and territory, 2009 and 2010



"-" Data were not available for Alberta, Québec, and New Brunswick.

FIGURE 4

Percentage of women who had a subsequent Pap test within 42-months of a negative Pap test by age group, provinces and territories combined, 2009-2010



Includes Northwest Territories, Saskatchewan, Prince Edward Island, British Columbia, Newfoundland and Labrador, Manitoba, Nova Scotia, and Ontario.

What do the Results Mean?

Retention for women who have a negative Pap test remains fairly high across all age groups. However, 20% of women do not return in the 42 months after their previous test. More information is needed about why these women were not re-screened in the recommended screening interval and what strategies can be implemented to improve screening retention.

Unsatisfactory Specimen Rate

What are we Measuring and Why?

The unsatisfactory specimen rate is the percentage of Pap test results in a 12 month period that are reported as unsatisfactory by the laboratory. An unsatisfactory Pap test can be caused by a number of factors including poor sample collection, obscuring inflammation or blood, insufficient cells, or a broken slide. The unsatisfactory rate varies by population, health care provider, laboratory reporting protocols, and collection method. Two collection methods are used in Canada: conventional cytology and liquid-based cytology (LBC). A conventional Pap test is performed by sampling cervical cells using a brush or spatula, fixing the cells on a slide, and examining the cells for abnormalities. In the last 10 years, LBC has been introduced as an alternative to the conventional Pap test. When using LBC, cells are sampled using a brush and are collected in a liquid vial, filtered by machine during which extraneous matter is removed, and transferred to a slide. The cells are distributed in a single layer on the slide making interpretation easier. LBC also permits the analysis of HPV presence and type. The Pap test is examined under a microscope by a cytotechnologist or cytopathologist and classified as either satisfactory or unsatisfactory. An unsatisfactory Pap test means that women must be re-retested and therefore unsatisfactory Pap tests should be minimized.

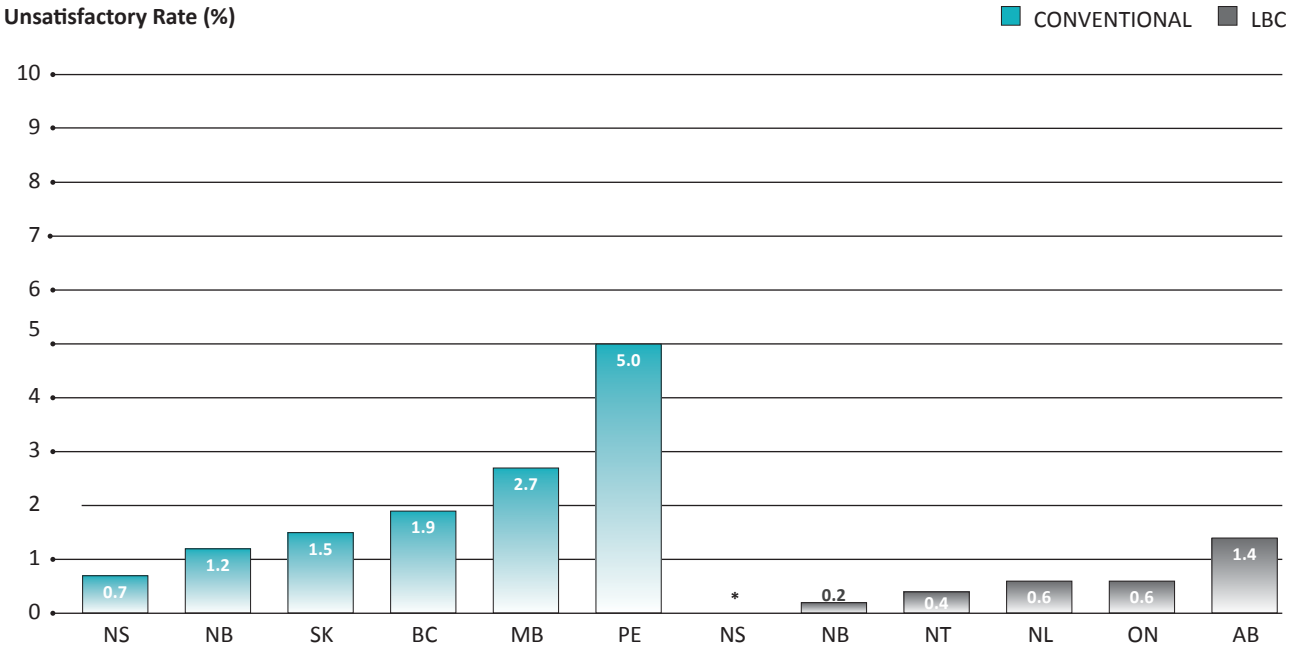
Target: *0.5% to 2%*

What are the Results?

The unsatisfactory rate for conventional cytology met the target for four provinces and ranged from 0.7% in Nova Scotia to 5.0% in Prince Edward Island (Figure 5). The unsatisfactory rate for LBC was much lower.

FIGURE 5

Percentage of unsatisfactory Pap test results for women 21 to 69 years of age by province and territory, 2012 and 2013



*Data from Nova Scotia were suppressed due to small numbers. Ontario provided data for women 20-69 years of age and for 2012 only.

What do the Results Mean?

The unsatisfactory specimen rate varies across provinces and test type. In general, the unsatisfactory rate is lower when LBC is used although previous analyses have found no difference in the unsatisfactory rate by type of cytology.[22] Reasons for the unsatisfactory rate should be monitored in each province and steps should be taken to help prevent unsatisfactory test results such as the use of proper collection devices and techniques.

Screening Test Results

What are we Measuring and Why?

Screening test results measure the percentage of women who had an abnormal Pap test result and also the most severe Pap test result in a 12-month time period. Because some women had more than one Pap test in the time period examined, only the most severe Pap test result on a satisfactory sample was included. Satisfactory Pap test results are classified using the 2001 Bethesda System as normal or (in order of severity) atypical squamous cells of undetermined significance (ASC-US), low-grade squamous intraepithelial lesions (LSIL), atypical glandular cells (AGC), atypical squamous cells - cannot exclude high grade squamous intraepithelial lesion (ASC-H), high-grade squamous intraepithelial lesions (HSIL), adenocarcinoma in situ or squamous cell carcinoma in situ, or adenocarcinoma or squamous cell carcinoma.[8]

Screening test results are influenced by the rate of cervical abnormalities in the population, interpretation, and reporting criteria. It is important to measure screening test results since the percentage of abnormal Pap test results influences colposcopy volume and wait times.

Target: *Not yet determined.*

What are the Results?

The percentage of women who had an abnormal Pap ranged from 3.9% in British Columbia and Prince Edward Island to 14.7% in New Brunswick (Table 1). Information was not available for Nunavut and Yukon. Figure 6 shows the distribution by abnormal cytology result for each province and territory. A higher percentage of women had a low-grade Pap test result (1.6% to 8.1% for ASC-US and 0.7% to 3.9% for LSIL). The percentage of women who had a high-grade Pap test result ranged from 0% to 1.3% for AGC, 0.2% to 0.8% for ASC-H, and 0.2% to 1.0% for HSIL or more severe. The percentage of women who had an abnormal Pap test result was highest for women 21 to 29 years of age and decreased with age (Figure 7). A higher abnormal rate is expected in young women due to the increased prevalence of HPV; most abnormal Pap tests were low grade and the majority of these infections will clear.[23]

TABLE 1

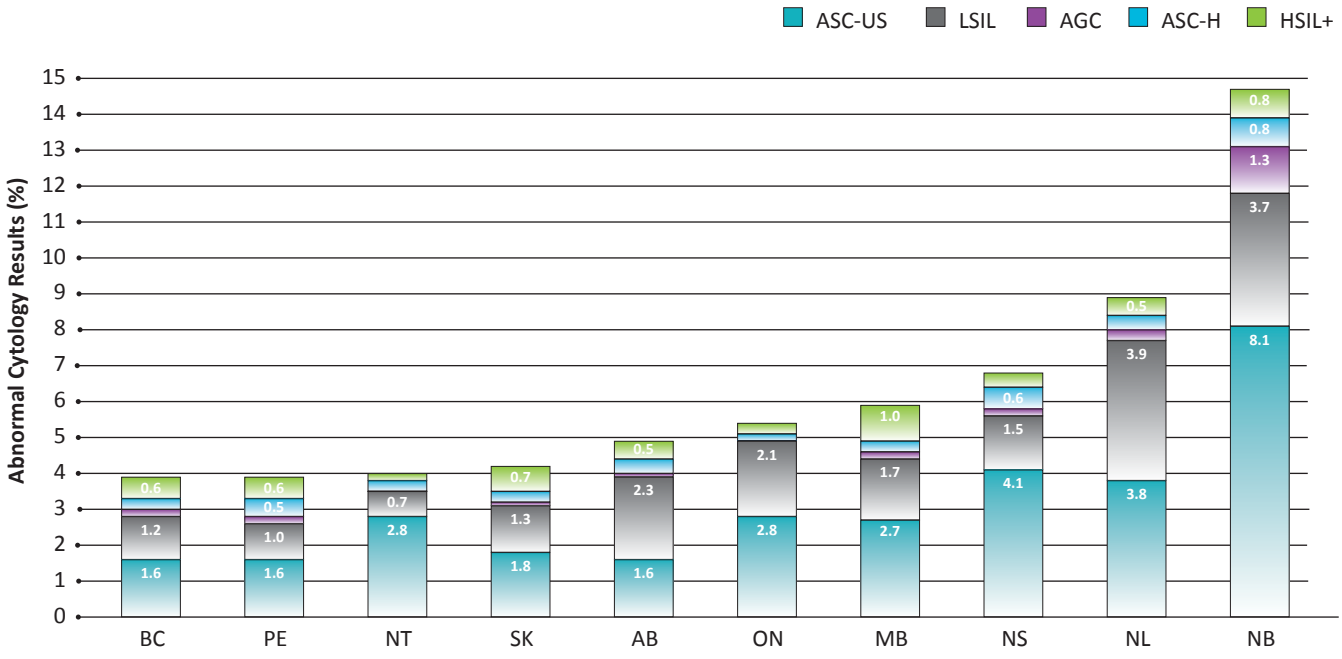
Percentage of women 21 to 69 years of age who had at least one Pap test in 2012 and 2013 by their most severe Pap test result and province and territory

	BC	AB	SK	MB	ON	NB	NS	PE	NL	NT
Negative	96.1	95.2	95.8	94.1	94.5	85.3	93.1	96.0	91.2	96.1
Abnormal	3.9	4.8	4.2	5.9	5.5	14.7	6.9	4.0	8.8	3.9
ASC-US	1.6	1.6	1.8	2.7	2.8	8.1	4.1	1.6	3.8	2.8
LSIL	1.2	2.3	1.3	1.7	2.1	3.7	1.5	1.0	3.9	0.7
AGC	0.2	0.1	0.1	0.2	0.0	1.3	0.2	0.2	0.3	0.0
ASC-H	0.3	0.4	0.3	0.3	0.2	0.8	0.6	0.5	0.4	0.3
HSIL+	0.6	0.5	0.7	1.0	0.3	0.8	0.4	0.6	0.5	0.2

The abnormal category may not be a direct summation of the sub-categories due to rounding.

FIGURE 6

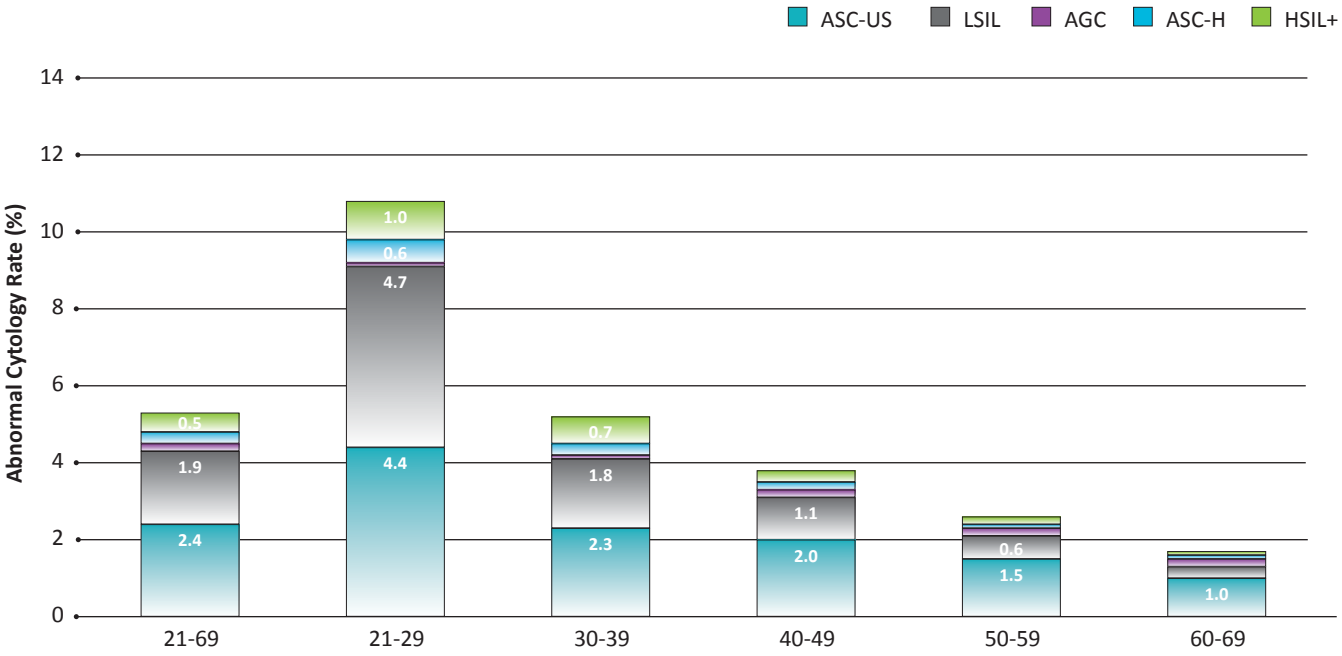
Percentage of women 21 to 69 years of age by most severe abnormal Pap test result by province and territory, 2012 and 2013



Data from Ontario include only 2012 for women 20 to 69 years of age. The HSIL+ category includes AIS.

FIGURE 7

Percentage of women by most severe abnormal Pap test result by age group, provinces and territories combined, 2012 and 2013



Includes British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador, and Northwest Territories. Data from Ontario include only 2012 for women 20 to 69 years of age. The HSIL+ category includes AIS. The age group 21-69 includes the Northwest Territories but all other age groups do not.

What do the Results Mean?

The percentage of women who had an abnormal Pap test result and the severity of the abnormality varied by province and territory. These differences are due to many inter-related factors such as differences in Pap test interpretation and the characteristics of the women screened. Abnormal rates may also related to participation and retention rates and the amount of time since the implementation of organized screening. Regardless of jurisdiction, the percentage of abnormal Pap tests was highest for women 21 to 29 years of age and decreased with age. Many of the 21 to 29 year old women with an abnormal Pap test result had a low-grade result (ASC-US or LSIL). These women will have been sent for further tests (primarily an additional Pap test) but their risk of invasive cervical cancer is very low.[24] Therefore, this performance measure reinforces the importance of following guidelines regarding the management of low-grade abnormalities in young women.

Cytology Turnaround Time

What are we Measuring and Why?

Cytology turnaround time is the time between the date the Pap test was performed and the date the Pap test was reported by the laboratory. Cytology turnaround time is a measure of the system's capacity to process Pap tests in a timely manner and is influenced by human resources and information systems.

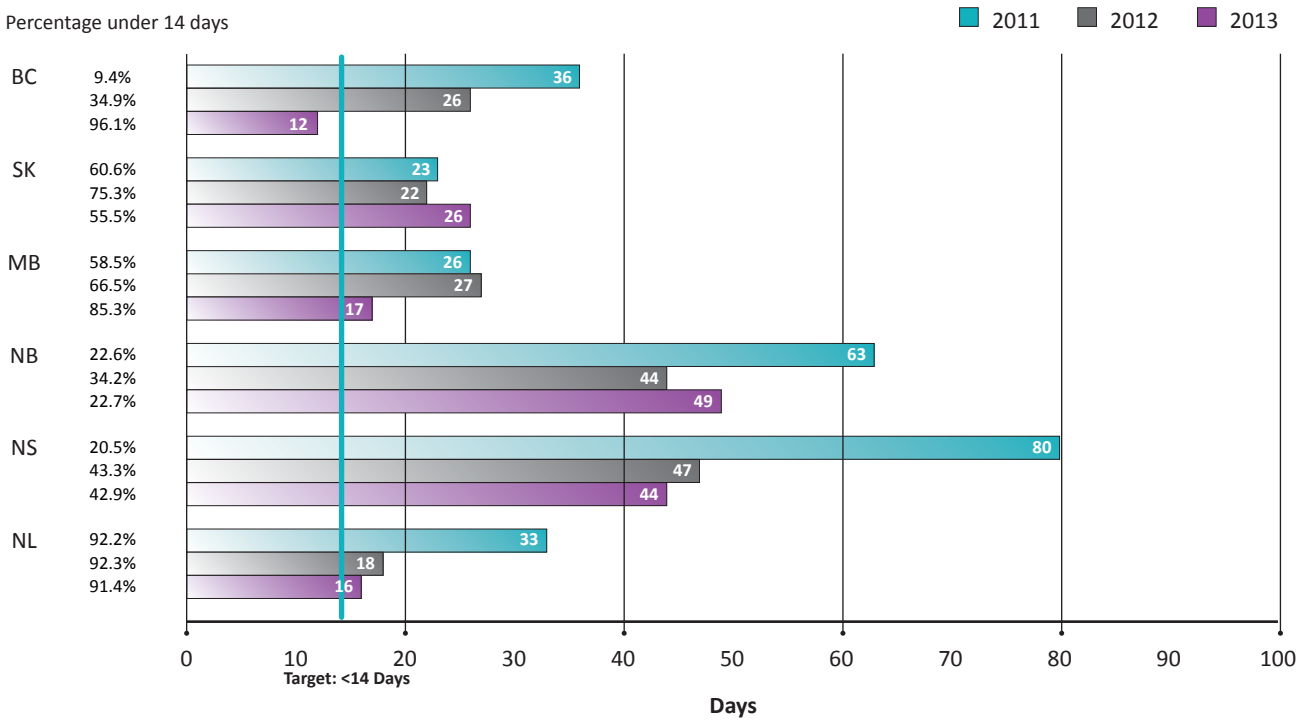
Target: *90% within 14 calendar days*

What are the Results?

In 2013, the percentage of Pap tests for which the time between the date the Pap test was performed and the date the Pap test was processed by the laboratory that were within 14 calendar days ranged from 22.7% in New Brunswick to 96.1% in British Columbia. The number of days at which the 90th percentile was reached ranged from 12 days in British Columbia to 49 days in New Brunswick. Ontario provided data for 2012; the number of days at which the 90th percentile was reached was 21 days (not shown in figure 8). For the provinces that provided three years of data, cytology turnaround time improved from 2011 to 2013.

FIGURE 8

Cytology turnaround time measured as the percentage less than 14 calendar days and the number of days at which the 90th percentile was reached by province and territory, 2011, 2012, and 2013



What do the Results Mean?

Cytology turnaround time is an important part of laboratory quality. Longer turnaround times may be the result of differing laboratory procedures. However, since both health care providers and women desire prompt reporting, additional strategies may be required in some areas to improve cytology turnaround time.

Time to Colposcopy

What are we Measuring and Why?

Time to colposcopy is the percentage of women with a high-grade Pap test result (AGC, ASC-H, HSIL+) who had a follow-up colposcopy within six weeks of the Pap test report date. A colposcopy is a visual examination of the cervix that is often accompanied by a biopsy to confirm a cervical abnormality. Time to colposcopy excludes colposcopies performed within seven days of the Pap test because the Pap test may have been taken at the time of colposcopy and is unlikely to be the reason for the colposcopy referral. Time to colposcopy is influenced by the cytology turnaround time. Results may also differ by province because of the completeness and availability of colposcopy data. Most importantly, measuring time to colposcopy is an important part of providing high quality, patient-centered care: long delays to colposcopy can increase the anxiety that women experience after being informed that the Pap test is abnormal and additional procedures are required.

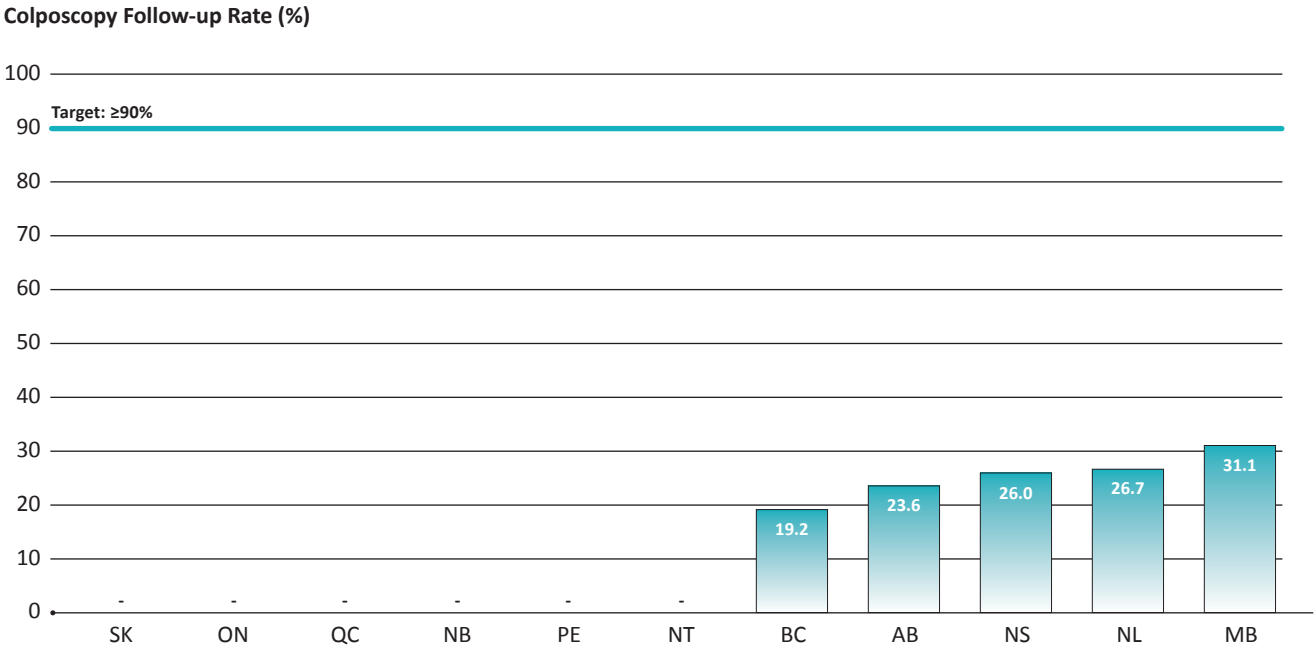
Target: *90% of women with a high-grade Pap test result should have a coloposcopy within six weeks of the Pap test report date.*

What are the Results?

The time from the Pap test report date to the colposcopy date was available for five provinces. The percentage of women who had a high-grade Pap test and a follow-up colposcopy within six weeks of the Pap test report date ranged from 19.2% in British Columbia to 31.1% in Manitoba (Figure 9). No provinces met the target. Figure 10 shows the number of days at which the 90th percentile was reached by age group and province in 2013.

FIGURE 9

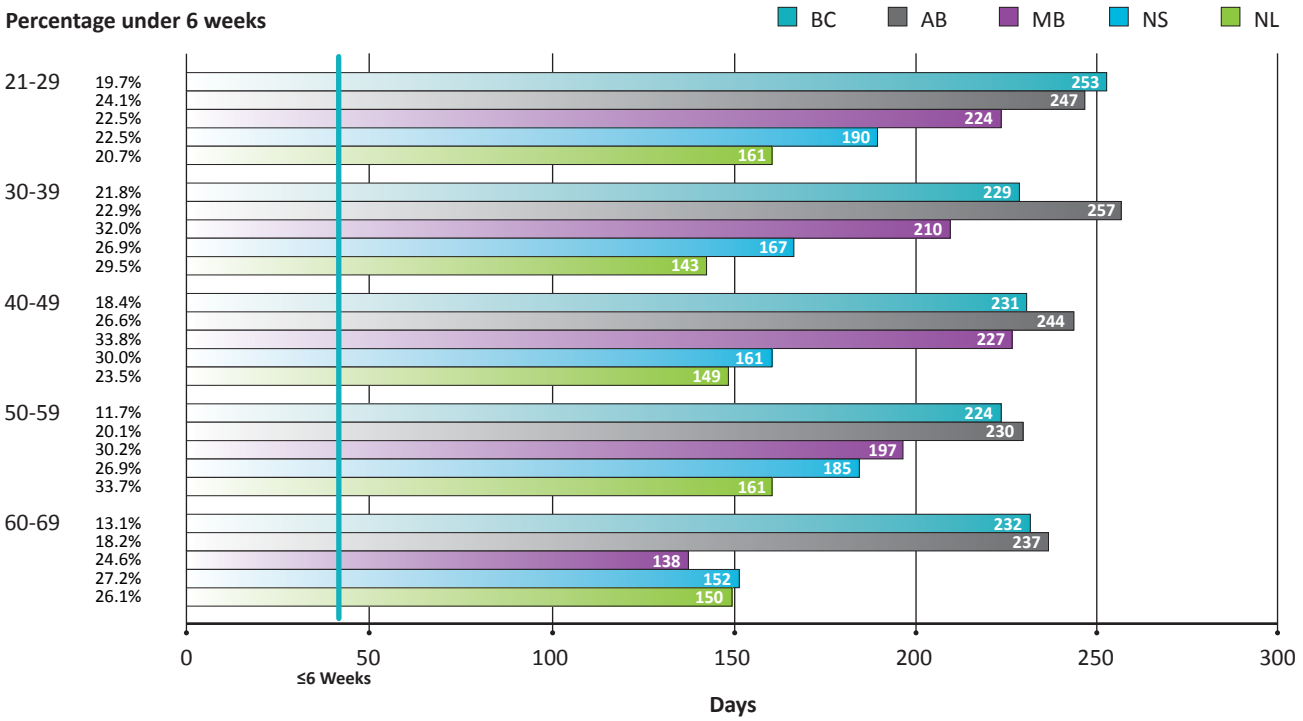
Percentage of women 21 to 69 years of age with a high-grade Pap test result (AGC/ASC-H/HSIL+) who had follow-up colposcopy within 6 weeks of the index Pap test report date, by province and territory, 2011, 2012 and 2013



"-" Data were not available for Saskatchewan, Québec, New Brunswick, Prince Edward Island, and Northwest Territories. Ontario provided data for women with high grade Pap test results who had follow up colposcopy or definitive treatment within 6 months of the index Pap test report date in 2013 (82.8%). Alberta provided data for 2012. HSIL+ includes adenocarcinoma in-situ, carcinoma in-situ, squamous cell carcinoma, adenocarcinoma and other malignancies. Women who had a definitive cervical treatment were also included if a follow-up colposcopy was not found.

FIGURE 10

Number of days at which the 90th percentile is reached for women with a high-grade Pap test result who had follow-up colposcopy by age group and province and territory, 2013



Alberta provided data for 2012. Ontario provided data for women with high-grade Pap test results who had follow-up colposcopy or definitive treatment within 6 months of the index Pap test (21-29: 82%, 30-39: 84.5%, 40-49: 83.6%, 50-59: 80.5%, 60-69: 81.8%). HSIL+ includes adenocarcinoma in-situ, carcinoma in situ, squamous cell carcinoma, adenocarcinoma and other malignancies. Women who had a definitive cervical treatment were also included if a follow-up colposcopy was not found.

What do the Results Mean?

Women with a high-grade Pap test should be seen for colposcopy within an acceptable time to minimize the anxiety associated with further follow-up and reduce the risk of neoplastic changes. However, the percentage of women with a high-grade Pap test result who had a colposcopy within six weeks is low. This target is similar to targets from Ireland (90% of women with a high-grade result should be offered an appointment within four weeks of referral) and the National Health Service (90% of women with moderate or severe dyskaryosis should be seen in a colposcopy clinic within four weeks of referral).[25, 26] The significant variation observed between provinces is likely due to the influence of cytology turnaround time, reporting and referral mechanisms, waiting time for colposcopy appointments, and the completeness of colposcopy data. In order to improve the time to colposcopy, screening programs and colposcopy providers can work to develop strategies such as providing colposcopy in an appropriate manner according Society of Obstetricians and Gynecologists of Canada (SOGC) guidelines (for example, not providing colposcopy to young women with a single, low-grade Pap test result), protocols for women to ensure they are notified of their abnormal Pap test, and colposcopy clinic efficiency measures such as triaging colposcopy appointments by Pap test severity and referring women back to their primary care provider once follow-up is complete.

Cytology-Histology Agreement

What are we Measuring and Why?

Cytology-histology agreement is the percentage of abnormal Pap tests with histological work-up found to have a pre-cancerous lesion or an invasive cancer in a 12 month frame. The agreement between screening cytology and histology is a measure of both the positive predictive value (PPV) of the Pap test and the accuracy of colposcopy assessment and biopsy interpretation. A low cytology-histology agreement may indicate that high-grade lesions are being over-called or that lesions are missed at colposcopy. The cytology-histology agreement rate is influenced by interpretive variables but also by the colposcopy follow-up rate, the histological investigation rate, and the completeness and availability of colposcopy and histology information.

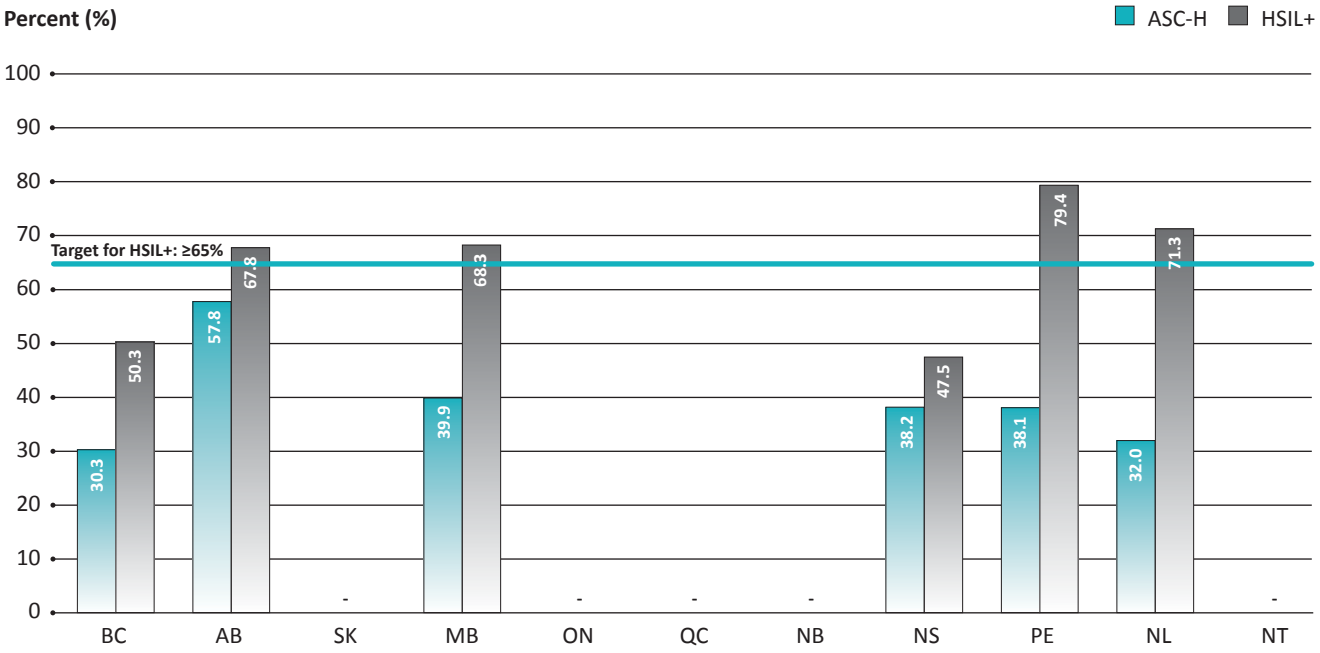
Target: *≥ 65 percent of high-grade Pap tests (HSIL+ cytology result) should have a pre-cancerous or an invasive cancer histological outcome.*

What are the Results?

Six provinces provided information on cytology-histology agreement. For women who had an ASC-H Pap test result, the cytology-histology agreement ranged from 30.3% in British Columbia to 57.8% in Alberta (Figure 11). Agreement was higher for women who had an HSIL+ Pap test result and ranged from 47.5% in Nova Scotia to 79.4% in Prince Edward Island. The cytology-histology agreement for ASC-H was highest for women 21-29 years of age and then decreased for women 40 years of age and older. The cytology-histology agreement for HSIL+ was highest for women 30-39 years of age, decreased for women 40-49 and 50-59 years of age, then increased slightly for women 60-69 years of age (Figure 12).

FIGURE 11

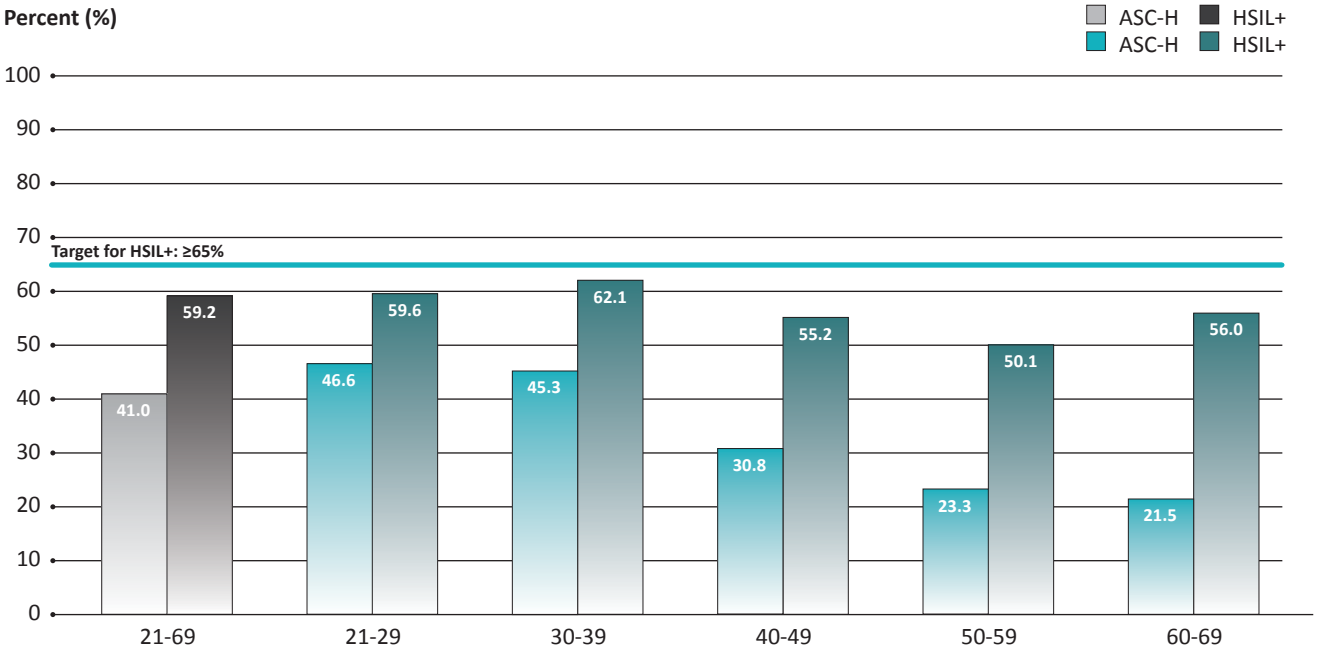
Percentage of Pap tests with ASC-H/HSIL+ results investigated with a biopsy that had a histological diagnosis of ASC-H/HSIL+ within 12-months of the Pap test for women 21 to 69 years of age by provinces and territory, 2011, 2012, and 2013



"-" Data were not available for Saskatchewan, Ontario, Québec, New Brunswick, and Northwest Territories. Alberta includes data for 2012 and 2013.

FIGURE 12

Percentage of Pap tests with ASC-H/HSIL+ results investigated with a biopsy that had a histological diagnosis of ASC-H/HSIL+ within 12-months of the Pap test by age group, provinces and territories combined, 2011, 2012, and 2013



Includes British Columbia, Alberta, Manitoba, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador. Alberta includes data for 2012 and 2013.

What do the Results Mean?

Four provinces met the target for women who had an HSIL+ Pap test result. Meeting this target is important since over-calling cytology (i.e., a false-positive Pap test result) can lead to unnecessarily sending women for colposcopy and can create longer wait times for women who do need a colposcopy. It is important to note that this performance measure is influenced by the time to colposcopy as well as the percentage of women who have a biopsy. The continued monitoring of this performance measure is critical to ensure women that follow-up treatment improves outcomes and to understand the impact of HPV vaccination on the PPV of the Pap test.

Histological Investigation

What are we Measuring and Why?

Histological investigation is the percentage of women with a high-grade Pap test result (ASC-H or HSIL+) who had a colposcopy and histology within 12 months of the Pap test. The Society of Canadian Colposcopists (SCC) and the SOGC recommend that all visible lesions should be biopsied and that all women referred with HSIL, even in the absence of an identifiable lesion at colposcopy, should have endocervical curettage and directed biopsy.[27] Therefore, information on the histological investigation was calculated with two different denominators: as a proportion of the number of women who had a high-grade abnormal Pap test and as a proportion of the number of women who had a high-grade abnormal Pap test who also had a colposcopy.

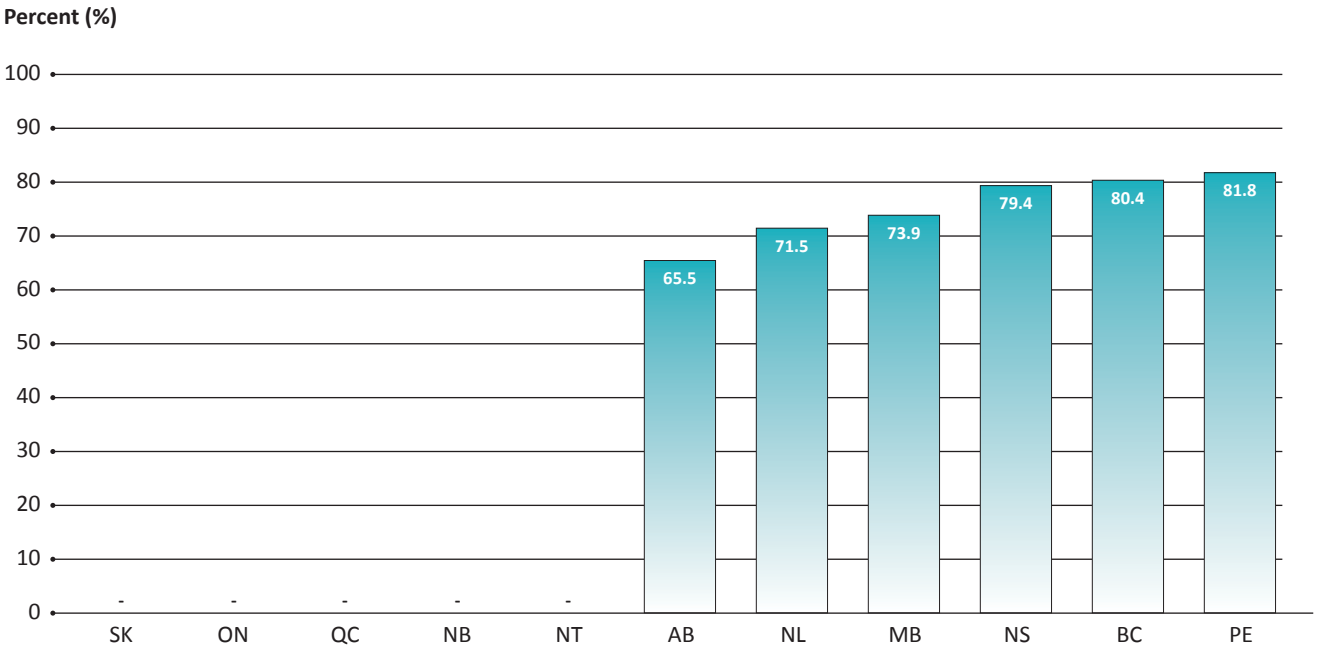
Target: *Not yet determined.*

What are the Results?

The percentage of women who had an ASC-H or HSIL+ Pap test result and a histological investigation within 12 months ranged from 65.5% in Alberta to 81.8% in Prince Edward Island (Figure 13). When limited to women who had a colposcopy and a histology investigation, the histological investigation rate increased and ranged from 73.2% in Newfoundland and Labrador to 93.9% in British Columbia (Figure 14).

FIGURE 13

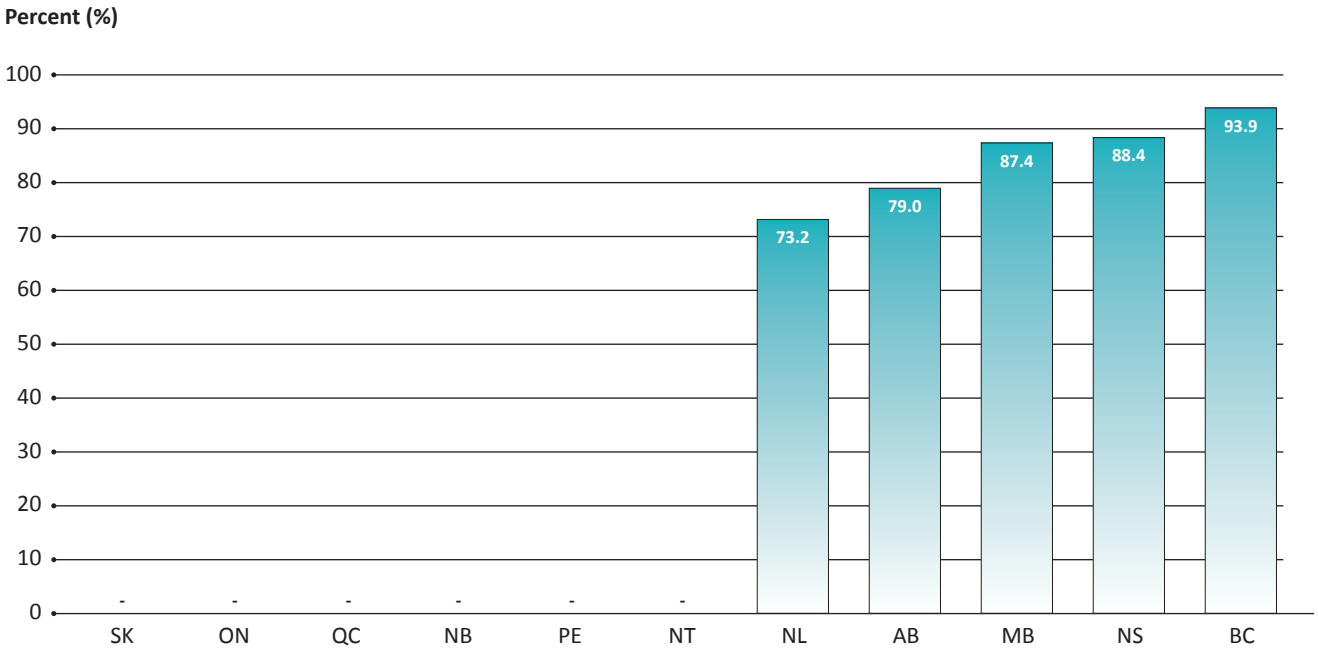
Percentage of women 21 to 69 years of age with an ASC-H or HSIL+ Pap test result that received a histological diagnosis within 12 months of the Pap test by province and territory, 2011, 2012 and 2013



"-" Data were not available for Saskatchewan, Ontario, Québec, New Brunswick, and Northwest Territories. Alberta includes data from 2012 and 2013.

FIGURE 14

Percentage of women 21 to 69 years of age with an ASC-H or HSIL+ Pap test result that had a colposcopy and received a histological diagnosis within 12 months of the Pap test by province and territory, 2011, 2012, and 2013



"-" Data were not available for Saskatchewan, Ontario, Québec, New Brunswick, Prince Edward Island, and Northwest Territories. Alberta includes data from 2012 and 2013.

What do the Results Mean?

Among the provinces that provided data for the histological investigation rate, the percentage of women who had a biopsy was high but varied by region. There is room for improvement as the current Canadian guideline recommends an investigation rate at the time of colposcopy of 100% for HSIL. However, histological investigation is influenced by the source of histology information, reasons for not performing histological investigation (i.e., pregnancy or the inability to identify the area of abnormality) and most importantly, the time to colposcopy as well as the availability of this data.

Pre-Cancer Detection Rate

What are we Measuring and Why?

The pre-cancer detection rate is the number of pre-cancerous squamous lesions detected per 1,000 women in the previous 12 months. Pre-cancerous lesions include biopsies with an HSIL result. Since cervical cancer screening can find and treat lesions before they progress to cancer, this measure provides feedback about cervical cancer prevention and control.

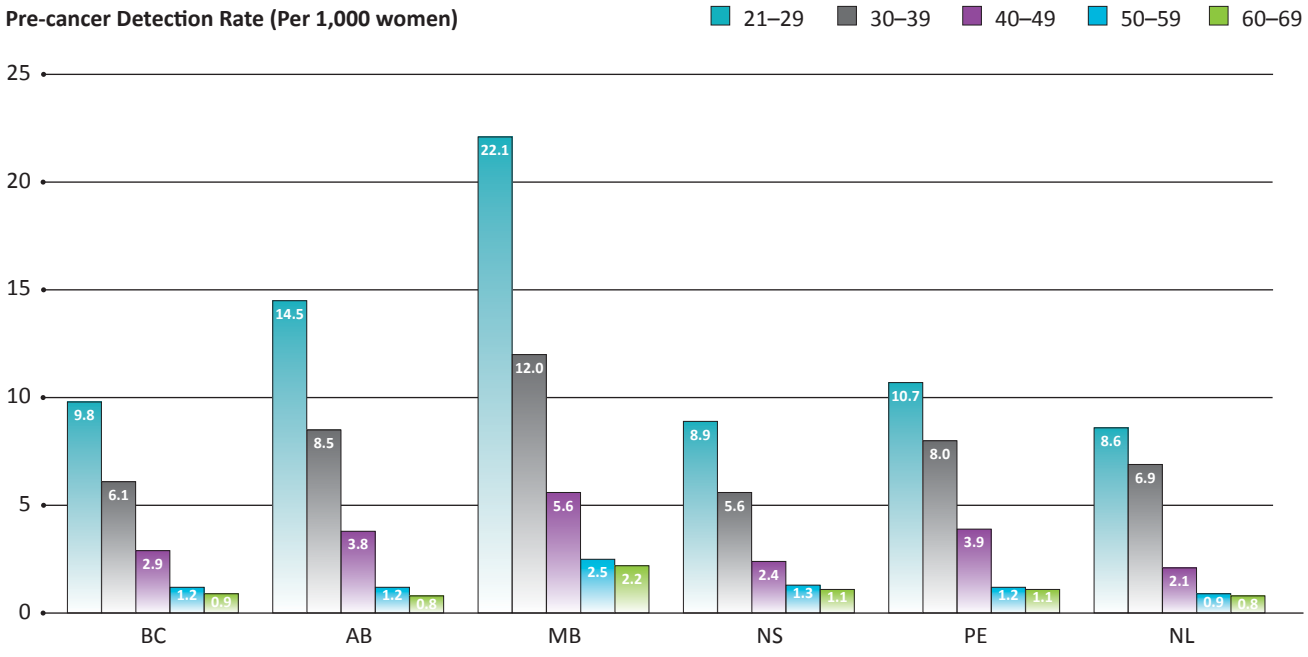
Target: *Not yet determined.*

What are the Results?

Figure 15 shows the pre-cancer detection rate by province and age group. In all provinces, the pre-cancer detection rate was highest for women 21 to 29 years of age followed by women 30 to 39 years of age. The rate drops to less than 1% for women 60 years of age and older.

FIGURE 15

Number of women diagnosed with a pre-cancerous lesion per 1,000 women screened by province and territory and age group, 2011, 2012, and 2013



Alberta includes data from 2012 and 2013.

What do the Results Mean?

Identifying and treating pre-cancerous lesions is a key part of effective cervical cancer control. The higher rate of pre-cancerous lesions in young women reflects the increased HPV prevalence in this population. In most cases, pre-cancerous lesions will not progress to invasive cervical cancer but treatment may have occurred that may have not been necessary. This is the reason why provincial cervical screening guidelines recommend less aggressive management for young women with low-grade abnormalities. This performance measure provides information about the balance between the benefits of cancer prevention and the harms of over screening and over-treatment in young women and should be interpreted together with the participation rate, abnormal rate, and the invasive cancer incidence rate for each age group.

Cancer Incidence

What are we Measuring and Why?

Cancer incidence is the age-standardized incidence rate per 100,000 women of invasive cervical cancer diagnosed in a year (standardized to the 2011 Canadian population). Cancer incidence reflects the ultimate goal of cervical screening - a reduction in the number of women diagnosed with cervical cancer. This performance measure includes all women 20 years of age and older.

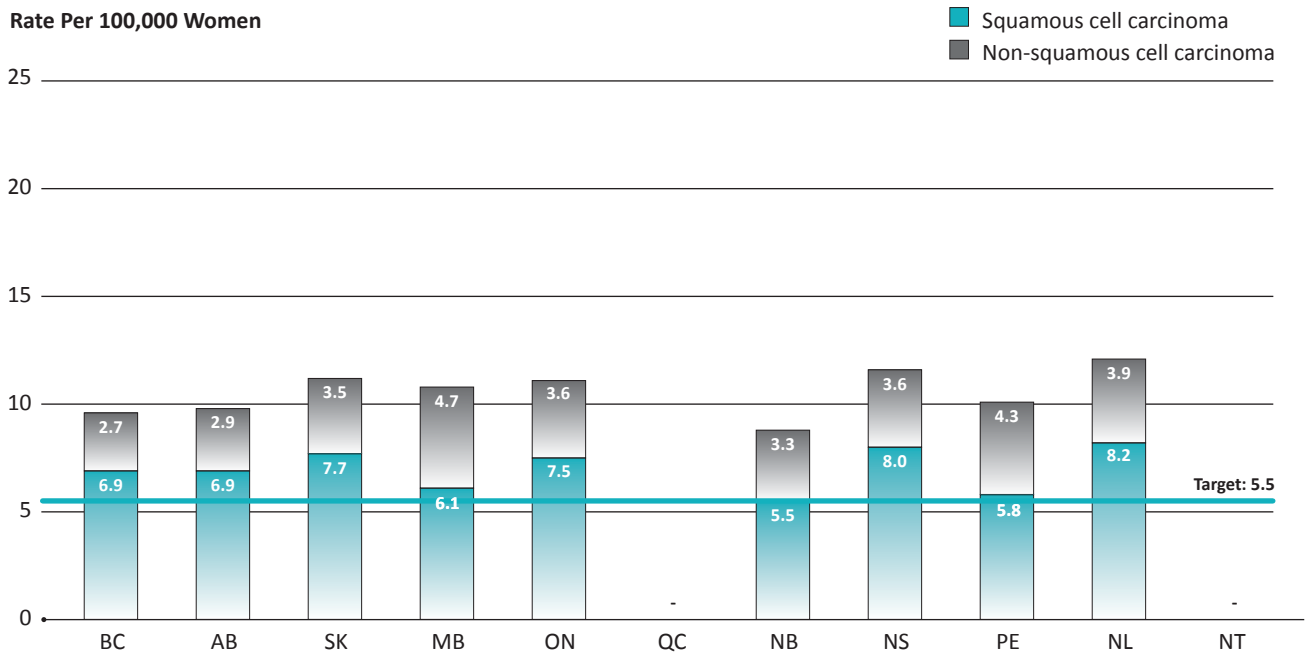
Target: *5.5 cases per 100,000 by 2037 (based on 80% screening participation and 70% immunization).*

What are the Results?

The age-standardized invasive cervical cancer incidence rate ranged from 8.8 per 100,000 women in New Brunswick to 12.1 per 100,000 women in Newfoundland and Labrador (Figure 16). The age-standardized squamous cell carcinoma rate ranged from 5.5 per 100,000 women in New Brunswick to 8.2 per 100,000 women in Newfoundland and Labrador. The age-standardized non-squamous cell carcinoma rate ranged from 2.7 per 100,000 women in British Columbia to 4.7 per 100,000 women in Manitoba. The lowest incidence occurred in women 20 to 24 years of age (1.2 and 0.6 per 100,000 women for squamous and non-squamous cell carcinoma respectively) (Figure 17). The highest incidence of squamous cell carcinoma occurred in women 40 to 44 years of age (11.6 per 100,000) and the highest incidence of non-squamous cell carcinoma occurred in women 35 to 39 years of age (5.4 per 100,000).

FIGURE 16

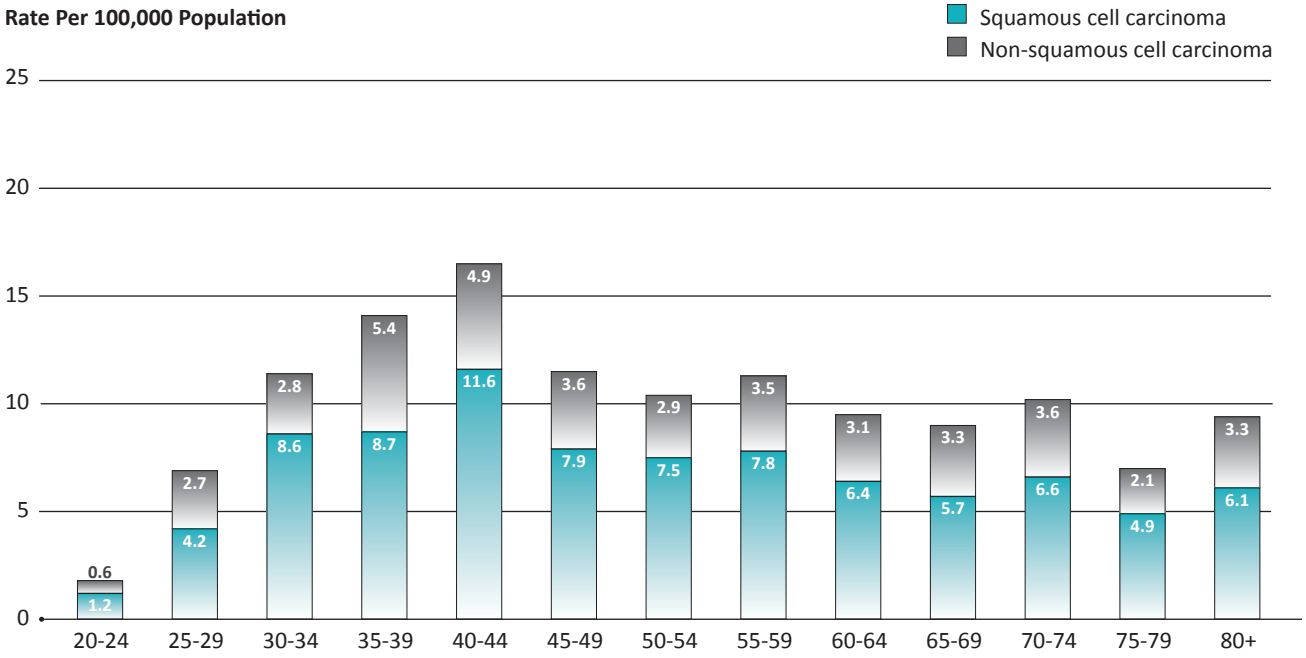
Age-standardized invasive cervical cancer incidence rate per 100,000 women, age 20 and over, by province and territory, 2011, 2012, and 2013



"-" Data were not available from Québec and the Northwest Territories. British Columbia includes data rom 2011 and 2012. Ontario provided data for women 20 to 69 years of age for 2010. Age standardized to the 2011 Canadian population.

FIGURE 17

Age-standardized invasive cervical cancer incidence rate per 100,000 women by age group, provinces combined, 2011, 2012, and 2013



Includes British Columbia, Alberta, Saskatchewan, Manitoba, New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador. British Columbia includes data from 2011 and 2012. Age standardized to the 2011 Canadian population.

What do the Results Mean?

The incidence of invasive cervical cancer in Canada has decreased significantly over time.[3, 28] However, from 2011 to 2013, 935 women were diagnosed with invasive cervical cancer (excluding Ontario, Québec, and the Territories). This number can be decreased further if 70% of young women receive the HPV immunization and if 80% of women are screened for cervical cancer every three years.

Percent of Cancers Diagnosed at Stage I

What are we Measuring and Why?

Cancers diagnosed at stage I (or the early stage invasive cancer detection rate) is the percentage of invasive cervical cancers diagnosed at stage I in a 12 month period using the International Federation of Gynecology and Obstetrics (FIGO) stage classification system. Stage I is the earliest stage where the cancer has invaded the cervix but is not growing outside the uterus.[29] Stage at diagnosis is strongly related to survival.[30] Therefore, although the primary goal of cervical screening is the prevention of cervical cancer, a secondary benefit of screening is the diagnosis of cervical cancer earlier when it can be more easily treated and with greater chances of cure.

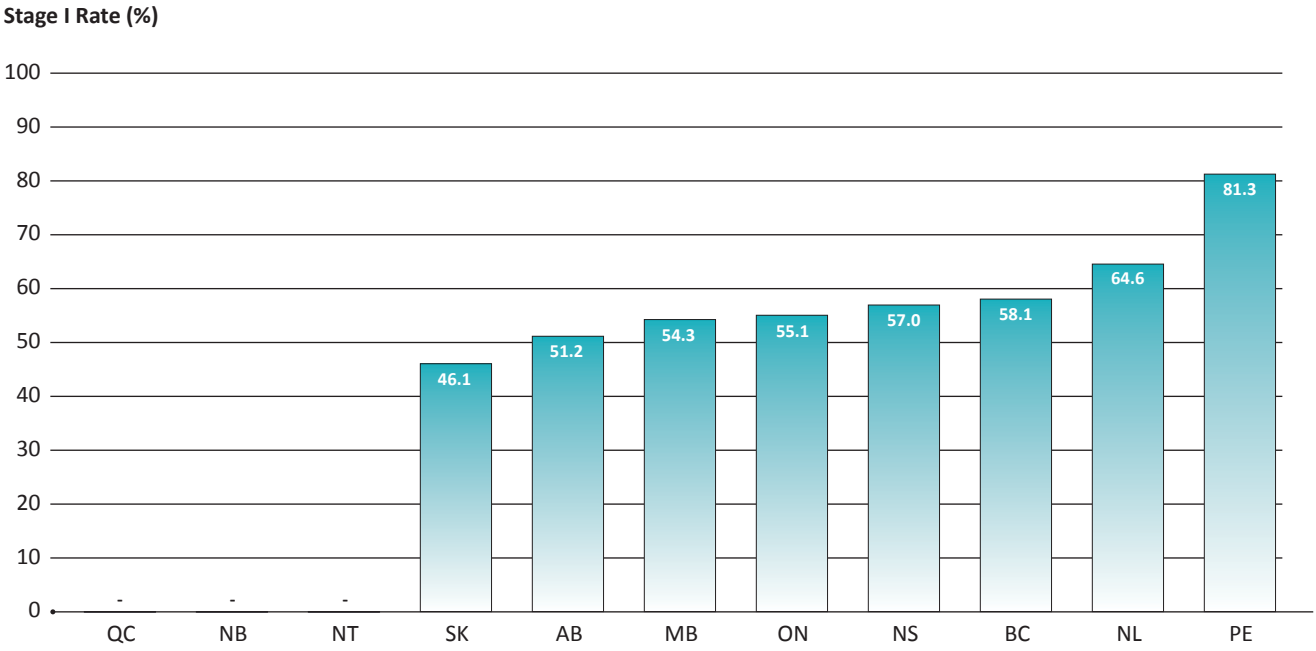
Target: *Not yet determined.*

What are the Results?

The percentage of invasive cervical cancers detected at stage I ranged from 46.1% in Saskatchewan to 81.3% in Prince Edward Island (Figure 18).

FIGURE 18

Percentage of invasive cervical cancers diagnosed at stage I for women 21 to 69 years of age by province and territory, 2011, 2012, and 2013



"-" Data were not available for Québec, New Brunswick, or the Northwest Territories. British Columbia includes data from 2011 and 2012. Ontario includes data for 2011 for all ages.

What do the Results Mean?

In most provinces, over half of the women diagnosed with invasive cervical cancer were diagnosed at stage I reducing the complexity of treatment and improving survival.

Screening History in Cases of Invasive Cancer

What are we Measuring and Why?

Screening history in cases of invasive cancer is a retrospective summary of screening prior to diagnosis. Screening history is measured by the percentage of women diagnosed with invasive cervical cancer whose last Pap test was less than six months (likely performed during a diagnostic appointment rather than screening purposes), six months to three years (within the guidelines), more than three to five years (overdue), or more than five years before the date of cancer diagnosis. More than five years includes women who had no record of a Pap test.

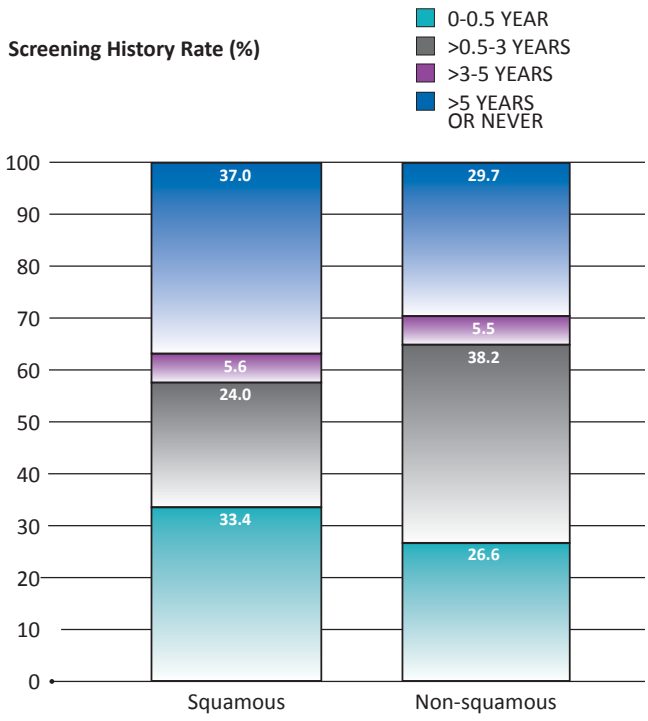
Target: *Not yet determined.*

What are the Results?

Figure 19 shows the screening history for women diagnosed with squamous cell and non-squamous cell carcinoma. It is important to note that the percentage of women in the 0-0.5 year category may be slightly underestimated due to the way the numerator was calculated. Overall, 24.0% of women diagnosed with squamous cell carcinoma and 38.2% of women diagnosed with non-squamous cell carcinoma had a Pap test more than 6 months to three years prior to diagnosis while 5.6% of women diagnosed with squamous cell carcinoma and 5.5% of women diagnosed with non-squamous cell carcinoma were overdue for screening. In addition, 37.0% of women diagnosed with squamous cell carcinoma and 29.7% of women diagnosed with non-squamous cell carcinoma had a Pap test greater than five years before their diagnosis or had no record of a Pap test.

FIGURE 19

Screening history for women 21 to 69 years of age diagnosed with invasive cervical cancer by histology, provinces combined, 2011, 2012, and 2013



Includes British Columbia, Alberta, Saskatchewan, Manitoba, New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador.
British Columbia includes data from 2011 and 2012.

What do the Results Mean?

Women who had a Pap test greater than five years before a diagnosis of invasive cervical cancer or who had no record of a Pap test represent cases of cancer that may have been prevented with regular screening. If it is assumed that women who had a Pap test in the six months prior to a diagnosis had a Pap test during a diagnostic appointment and not for screening, the percentage of women diagnosed with cancer for whom cancer could have been prevented with regular screening increases to 70.4% for squamous cell carcinoma and 56.3% for non-squamous cell carcinoma. The women who had a Pap test in the six months to three years before a diagnosis represent a failure of the Pap test to detect cancer, inappropriate or inadequate follow-up, or aggressive cancers that progress in short time period. This percentage is much higher for non-squamous cell carcinoma since it is less easily detected by the Pap test.

HPV Testing

What are we Measuring and Why?

An improved understanding of the role of HPV in the etiology of cervical cancer has led to the evaluation of HPV DNA testing as an alternative method for cervical screening. HPV testing detects HPV DNA on the cervix. HPV testing can be used for primary screening alone, in combination with cytology, or for the triage of women with equivocal cytology results (i.e., ASC-US or LSIL). Several large randomized controlled trials have found that HPV testing has a higher sensitivity for the detection of pre-cancerous lesions (cervical intraepithelial neoplasia (CIN) 2 and 3) than screening with the Pap test.[31] This higher sensitivity could lead to longer screening intervals and result in fewer tests. However, the specificity may be lower resulting in an increase in the number of women referred for colposcopy, particularly for women younger than 30 or 35 years of age.[32] HPV testing may also be more costly particularly if women or health care providers do not adhere to the recommended screening interval. Therefore, it is important to carefully evaluate the costs and benefits primary HPV testing prior to implementation. The results from the HPV FOCAL trial in British Columbia comparing the Pap test with HPV testing will provide additional information for screening policy decision making in Canada.[33]

Target: *Not yet determined.*

What are the Results?

HPV testing is currently used for the triage of women 30 years of age and older who had an ASC-US Pap test result in Alberta, Ontario, Québec, New Brunswick, Prince Edward Island, Newfoundland and Labrador, the Northwest Territories, and Nunavut (Table 2). Alberta and New Brunswick also use HPV triage for women over 50 years of age with a LSIL Pap test result. HPV testing is used for follow-up after treatment to determine treatment success in British Columbia, Manitoba, and the Northwest Territories. Primary HPV test pilot studies such as the HPV FOCAL Trial and further research are ongoing in several provinces.

TABLE 2

HPV DNA testing by province and territory as of July 2015

Province/Territory	HPV DNA Testing
British Columbia	HPV testing for follow-up after treatment. HPV FOCAL study for primary HPV testing.
Alberta	HPV triage in women > 30 years of age with an ASC-US Pap test result or women > 50 years of age with an LSIL Pap test result.
Saskatchewan	On-going pilot studies.
Manitoba	HPV testing for follow-up after treatment.
Ontario	HPV triage for women with an ASC-US Pap test result ≥ 30 years of age. HPV primary testing is recommended but HPV triage and primary testing is not yet funded.
Québec	HPV triage for women ≥ 30 years of age with an ASC-US Pap test result.
New Brunswick	HPV triage in women > 30 years of age with an ASC-US Pap test result or women > 50 years of age with an LSIL Pap test result.
Nova Scotia	On-going pilot studies.
Prince Edward Island	HPV triage for women ≥ 30 years of age with an ASC-US Pap test result.
Newfoundland and Labrador	HPV triage for women > 30 years of age with an ASC-US Pap test result.
Northwest Territories	HPV triage in women > 30 year of age with an ASC-US Pap test result or postmenopausal women with LSIL/ASC-US Pap test result. Also used for follow-up after treatment.
Yukon	Information not available.
Nunavut	HPV triage for women > 30 years of age with an ASC-US Pap test result.

Data source: Cervical Cancer Screening Guidelines Across Canada: Environmental Scan. Toronto: Canadian Partnership Against Cancer. July 2015.

What do the Results Mean?

HPV DNA testing is used in many provinces and territories to triage of women with an ASC-US or LSIL Pap test result in order to help determine appropriate follow-up. As HPV testing continues to become more widely available and is incorporated into provincial and territorial screening guidelines, it will be important to monitor its impact on screening outcomes. Primary HPV testing has not yet been implemented in Canada. In 2016, the Netherlands will implement primary HPV testing every five years for women starting at age 30 and Australia will begin primary HPV testing for women starting at 25 years of age. The introduction of liquid-based cytology permits easy introduction of HPV testing for either primary screening or triage testing. As results from the HPV FOCAL study in British Columbia and other research becomes available, decisions can be made about how to best use HPV testing.

HPV Vaccination

What are we Measuring and Why?

HPV vaccination measures the percentage of young women in a targeted cohort who received the HPV vaccine. Each province and territory in Canada currently co-ordinates and provides a school-based, publicly funded HPV vaccination program for girls aged nine to 14 years, with some catch-up vaccination provided up to 18 years of age. HPV vaccination surveillance and monitoring is important to understanding the impact on cervical cancer screening participation and Pap test results.

Target: *Not yet determined.*

What are the Results?

HPV vaccination programs and uptake varies by province from 47% in the Northwest Territories to 92.8% in Newfoundland and Labrador (1st dose) (Table 3).

TABLE 3

HPV vaccination for girls by province and territory

Province/Territory	Program implementation start date	ROUTINE SCHEDULE (0, 2, 6 MONTHS)				
				Vaccination uptake		
		School grade	School year	1st dose	2nd dose	3rd dose
British Columbia	September 2008	Grade 6	2013-14	-	65.8%	NA (2 doses provided as of 2014)
Alberta	September 2008	Grade 5	2013-14	74.2%	-	64.9%
Saskatchewan*	September 2008	Grade 6 (13 years)	2012-13	80.3%	78.4%	73.7%
Manitoba	September 2008	Grade 6	2013-14	68.8%	65.8%	58.2
Ontario	September 2007	Grade 8	2012-13	-	-	80.2%
Québec	September 2008	Grade 4 (Pr. 3)	2013-14	81%	77%	NA (2 doses provided as of 2013)
New Brunswick	September 2008	Grade 7	2014-15	> 73%**	> 73%**	73%
Nova Scotia	September 2007	Grade 7	2013-14	88.8%	84.5%	75.0%
Prince Edward Island	September 2007	Grade 6	2013-14	90.6%	88.7%	84.9%
Newfoundland and Labrador	September 2007	Grade 6	2013-14	92.8%	93.7%	88.7%
Northwest Territories***	September 2009	Grade 7***	2013-14	47%	-	-
Yukon	September 2009	Grade 6	-	-	-	-
Nunavut	March 2010	Grade 6 or ≥ 9 years old	-	-	-	-

*Source: Saskatchewan Immunization Management System (SIMS). Data and Method: Immunization data were extracted from the Saskatchewan Immunization Management System (SIMS). According to the Saskatchewan Routine Immunization Schedule, the human papillomavirus (HPV) vaccine is offered to girls in Grade 6. Their immunization information is not, however, recorded by grade in SIMS. As a result, vaccine coverage for students in Grades 6 is assessed at 13 years of age. The coverage is estimated by selecting a group of girls born during a particular period (i.e., a birth cohort) who were registered in SIMS and had provincial health coverage. Immunization data for girls born between Sep-1999 and Aug-2000 are used to estimate vaccine coverage.

** An additional 5.3% received at least 1 or 2 doses.

*** Northwest Territories vaccinates in multiple grades (4-6).

"-" Information is not available.

Data source: Cervical Cancer Screening Guidelines Across Canada: Environmental Scan. Toronto: Canadian Partnership Against Cancer. July 2015.

What do the Results Mean?

There are significant differences in HPV vaccination rates across the country. This is likely related to differing program start dates and the impact of health promotion in each province and territory. As expected, HPV vaccination rates decreased with each dose. Research has found that the immune response from two doses is similar to the response among those who received three doses.[34] Therefore, the World Health Organization has changed its guidelines to support a shift to two doses among girls aged 9 to 14.[35] By reducing the number of doses that girls receive, it is hoped that more girls will complete a sufficient course to ensure immunity. As of 2015-2016, all publicly-funded school-based HPV immunization programs except those in Alberta and Nunavut have shifted to a two-dose schedule for girls. Prince Edward Island, Alberta and Nova Scotia have implemented school-based HPV vaccination programs for boys and Manitoba, Québec, and Ontario have announced the implementation of school-based programs for boys.

Continuing to provide school-based HPV vaccination programs and promoting high participation rates are important to cervical cancer control. Statistical modelling using the Cancer Risk Management Model (CRMM) found that cervical cancer incidence and mortality are projected to be lower in women who have been vaccinated for HPV.[36] The CRMM also projected a sharp decline in HPV 16 and 18 prevalence with a 70% vaccination rate. This decline has already been seen in other countries such as the United Kingdom and Australia that have also implemented national HPV vaccination programs.[37, 38] Recent research from British Columbia found a significant reduction in CIN2+ lesions in women 15 to 17 years of age after the introduction of the HPV vaccination in 2008.[39]

SPECIAL FEATURE:

Cervical Cancer Screening in Young Women

New cervical cancer screening guidelines introduced by most provinces over the previous few years no longer recommend screening in women less than 21 years of age. Therefore, in order to provide baseline data about screening in this age group and to examine changes in the screening of young women over time, this special section focuses on screening in women 18 to 20 years of age at the start of or just prior to the guideline changes. Information was available from British Columbia, Alberta, Saskatchewan, Manitoba, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador, and the Northwest Territories. Alberta and New Brunswick changed their guidelines the earliest (mid-2011), while Prince Edward Island and Nova Scotia changed their guidelines the latest (2013).

Historically, provincial and territorial screening guidelines recommended screening starting at 18 years of age or within three years of becoming sexually active.[9] Cervical screening was recommended for young women for several reasons including the hope that by starting screening at a young age, it would be continued throughout a woman's lifetime and the belief by detecting and treating cervical abnormalities in young women, cervical cancer incidence and mortality would be decreased at older ages.[7, 40]

However, currently available data does not support these views. There is no evidence available regarding a recommended interval between first sexual activity (with the potential for HPV infection) and the need for a first-time Pap test or for more frequent screening for women at increased risk because of multiple sexual partners.[7] Other jurisdictions (the United Kingdom, Nordic countries) that have delayed the start of cervical cancer screening have not found a reduction in screening participation at later ages nor a higher incidence of cancer in women under 30 years of age.[41, 42] Studies have also found that approximately 90% of low-grade cervical abnormalities in adolescent women regress within 36 months and only 3% progress to high-grade disease.[43-45] By delaying screening to the mid-20s, transient reversible lesions in adolescent women associated with HPV have time to regress while more significant lesions requiring intervention can be detected at a later age without an increase in cancer incidence. In a recent Canadian time trend analysis, Popadiuk et al. found that invasive cervical cancer incidence was constant from 1970 to 2007 among 15 to 19 year olds at ≤0.3 cases per 100,000 despite a downward trend in Pap test use since 1985 among women in this age group.[24]

There are also potential harms from cervical cancer screening including the anxiety and psychological morbidity created by informing women that they have a pre-cancerous lesion and the adverse outcomes associated with treatments such as loop electrosurgical excision procedures (LEEP) (including unnecessary or over-treatment). [46-49] These harms are greater in younger women because a higher percentage of adolescents (and women under the age of 30) that have a Pap test will have abnormalities that require further evaluation and treatment.[44, 50, 51] Further treatment often includes colposcopy, biopsy, and minor ablative and excisional procedures (LEEP) which are generally very safe; immediate complications such as hemorrhaging are rare and more serious complications are extremely rare. However, recent studies have found that pregnancies in women previously treated for cervical abnormalities are more likely to result in preterm deliveries (premature labour and premature rupture of the membranes) than are pregnancies in women who have not been treated for cervical dysplasia.[52] Since younger women are more likely to have pregnancies after treatment, delaying treatment could have a substantial impact on the chances of a subsequent preterm delivery. In the rare instance when invasive cancer does develop in women younger than 21 years of age, it is often more rapidly progressive than disease developing in older women and therefore, more difficult to prevent with screening.[48]

Cervical cancer screening in young women also incurs significant economic costs. In order to estimate the cost of screening women 18 to 20 years of age, we used the Cancer Risk Management Model (CRMM)[1] developed by the Partnership in collaboration with Statistics Canada. The CRMM is a web-based microsimulation tool that uses Canadian population-based scenarios, the natural history of

HPV infections and cervical cancer to provide information about cervical cancer screening effectiveness and efficiency.[53] In order to determine the cost of screening, the model assumes that 56% of women 18-20 years of age had a Pap test in the previous three years (based on initial participation and retention rates as well as the interaction of these rates with other model variables such as the screening interval and the follow-up of abnormal Pap tests). The model also assumes that if a woman had a normal Pap test result she will continue regular screening and no additional follow-up or treatment will be required. If the Pap test result was ASC-US, 20% of women will be followed up by colposcopy and 80% of women will have a repeat Pap in six months. Women who had an ASC-H or more severe Pap test result will be sent for colposcopy, biopsy, and treatment. Key model assumptions and definitions are available in Appendix E.

Using the model, an estimated 232,201 Pap tests were performed on 18-20 year old Canadian women in 2012 (225,614 Pap tests for screening purposes and 6,587 follow-up Pap tests) (Table 4). Therefore, in this model, in 2012, 34% of 18-20 year old women had a screening Pap test (225,614/656,539). Overall, 12,869 Pap test results were low-grade and 6,390 were high-grade abnormal Pap results. The total number of colposcopies performed was 32,605. A total of 7,033 LEEP, 13,256 biopsies, and 1,964 other pre-cancerous procedures and treatments were performed. Based on the meta-analysis by Kyrgiou et al. (2014), cervical treatment is associated with a risk of second trimester miscarriage of 1.6% (compared to a risk of 0.4% among untreated women). If approximately 6,390 women with a high-grade Pap test had an average of one pregnancy each, screening these women might result in 77 second trimester miscarriages.[52] This is significantly higher than the incidence of cervical cancer in these women.

The cost of providing and processing the Pap test was $13,813,656 (Canadian dollars in 2008). The cost of colposcopy, LEEP, biopsies, and other follow-up treatments was $43,818,594. Therefore, the total estimated cost of cervical screening using the Pap test and follow-up for 18-20 year old women for one year was $57,632,250.

As previously stated, based on the lack of evidence regarding the benefits of cervical screening for young women and the potential for harm, provincial and territorial cervical cancer screening guidelines have recently been updated and no longer recommend screening in women less than 21 years of age regardless of prior sexual history. In January 2013, the Canadian Task Force on Preventive Health Care also published updated recommendations; the Task Force does not recommend routinely screening women less than 20 years of age for cervical cancer (strong recommendation, high quality evidence) or women 21 to 24 years of age (weak recommendation, moderate quality evidence)[2]. The Task Force guidelines aim to strike a balance between trying to reduce the very rare occurrence of cervical cancer in young women and the harm caused to 98% of young women who would never develop cervical cancer.[54] These guidelines may change again in the near future due to the widespread introduction of HPV immunization and the use of HPV testing – the age at which screening starts may be increased, screening intervals may be lengthened, and screening may end earlier.

Given our knowledge about the benefits and risks of screening in young women and the estimated cost to the health care system, it is clearly important to reduce cervical cancer screening in women younger than 21 years of age. Health care providers have a key role in this task by knowing the current guidelines, understanding the reasons behind the recommendations for not screening young women, and helping to educate women about these changes. Studies have reported that women's concerns about changing cervical cancer screening guidelines include a decrease in overall health and well-being.[55] Some women have also expressed a preference for frequent testing to prevent cancer even if this results in anxiety due to false-positive test results or unnecessary procedures.[56-58] However, studies have clearly shown that women accept less screening if it is recommended by their health care provider.[59]

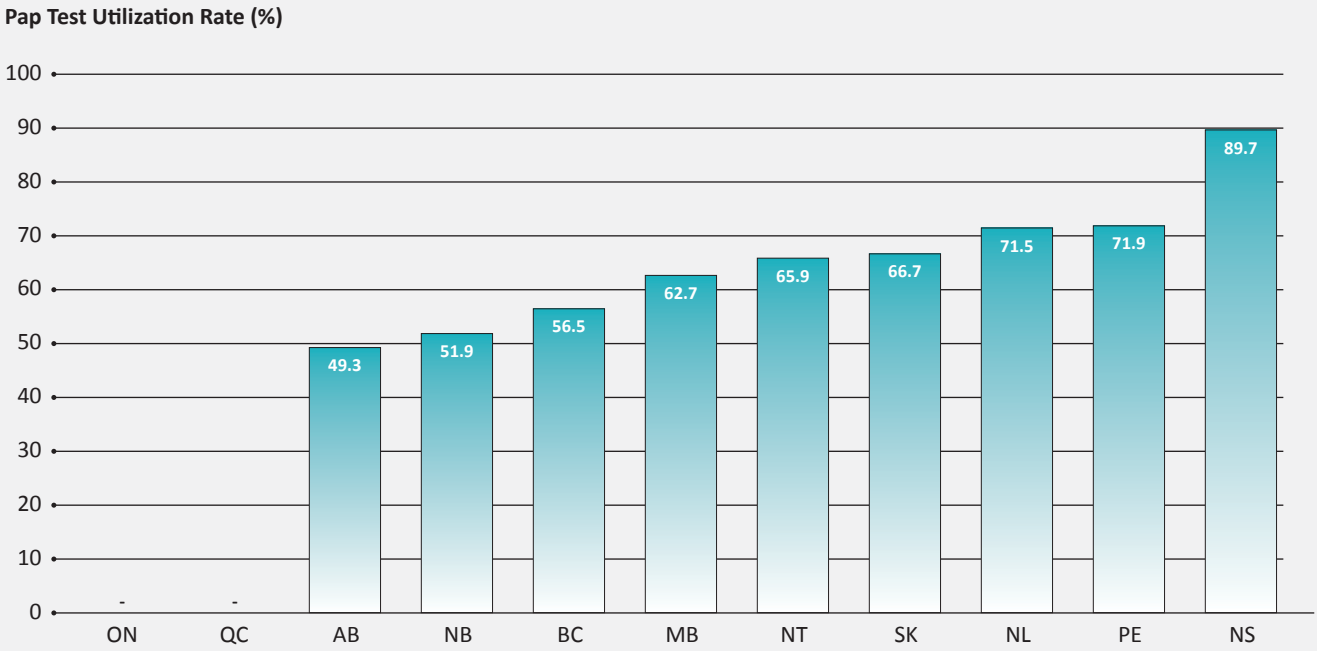
As the recently updated guidelines that no longer recommend screening women less than 21 years of age are adopted in routine health care practice in each province, it is expected that screening in young women will decrease. The monitoring of screening in women less than 21 years of age is important to minimize the harms of screening. On-going monitoring of screening in women 21 to 24 years of age is also necessary so that programs can continue to follow and make informed decisions about whether or not new guidelines are warranted in future.

[1] CRMM version 2.2.

[2] To minimize harms, cervical cancer screening before the age of 21 is not recommended regardless of sexual history by the United States Preventive Services Task Force, the American Cancer Society, the American Society for Colopscopy and Cervical Pathology, the American Society for Clinical Pathology, and the American Congress of Obstetricians and Gynecologists.

FIGURE 20

Percentage of women 18 to 20 years of age who had at least one Pap test in a 42-month period by province and territory, January 1, 2010 to June 30, 2013



"-" Data were not available for Ontario and Québec. New Brunswick includes data from January 1, 2011 to June 30, 2014.

TABLE 4

Estimated number and cost of screening women 18-20 years of age in 2012 using the Cancer Risk Management Model

Women 18 to 20 years of age	Number	Cost (2008$)
Number of Pap tests*	232,201	
Low-grade abnormal	12,869	13,813,656
High-grade abnormal	6,390	
Colposcopy	32,605	24,978,436
LEEP	7,033	13,273,465
Biopsy	13,256	1,361,527
Other pre-cancer procedures and treatments	1,964	4,205,166
Total		57,632,250

* includes 225,614 Pap tests for screening (97.2%) and 6,587 follow-up Pap tests (2.8%).

Conclusions and Future Directions

This report provides outcomes for national cervical cancer screening program performance measures and descriptive information about HPV testing and HPV vaccination. This is also the first report to include nationally developed targets for six performance measures.

Across Canada, cervical cancer screening participation is fairly high but appears to be stable or decreasing slightly over time. More information is now needed about the characteristics of the 20-30% of women who are not screened for cervical cancer and what types of additional interventions are needed to ensure that women make an informed decision about participating in cervical cancer screening and where appropriate, improve screening uptake. Screening these women is key to cervical cancer control as we know that 30 to 40% of women diagnosed with invasive cervical cancer did not have a Pap test in the five years before their diagnosis or they had no record of a Pap test. In 2015, a pan-Canadian meeting organized by the Partnership was held to discuss gaps in knowledge regarding the barriers and enablers to increase screening for Canadian underserved populations, to examine the reasons why screening disparities in Canadian underserved populations have persisted, and to review and advise on the proposed approach for the next phase of the Screening in Underserved Populations to Enhance Reach (SUPER) project.

The quality of the Pap test remains high; most provinces have incorporated LBC and have reached the target for unsatisfactory Pap tests. Cytology turnaround time also appears to be improving over time. The cytology histology agreement or the PPV of the Pap test reaches the target of ≥65% for high-grade abnormalities in many provinces. However, minimizing the time to colposcopy is a complex issue and continues to be a challenge for most jurisdictions.

Cervical cancer incidence has been greatly reduced by screening with the Pap test. Trends over time for both squamous and non-squamous cell carcinoma incidence should still be monitored as the proportion of squamous cell carcinoma appears to be increasing. The impact of HPV vaccination is expected to decrease the incidence even further and, along with an increase in the participation of unscreened women, will hopefully allow us to reach the cervical cancer incidence goal of 5.5 cases per 100,000 by 2037.

The analysis of screening in women 18 to 20 years of age found that many of these women had a Pap test whose follow-up caused both significant harm to women and cost to the health care system. The number of young women screened is expected to decrease as women and health care providers become aware of the new screening guidelines that recommend a start age of 21.

Ensuring that the right women are screened for cervical cancer at the right interval and that the screening technology used is evidence based and of high quality remains the primary goal for screening programs. The PCCSN will continue to support this goal by bringing together key provincial and territorial players in cervical cancer screening from across the country to strengthen existing screening programs and deliberate the implications of new research and practice evidence. We hope to support improvements in screening through information exchange, sharing of best practices and regular reporting and analysis of cervical cancer screening program data.

Over the next few years, the PCCSN members have identified screening among low-income populations (from the SUPER workshop) and the development of national quality indicators for colposcopy as a key quality improvement project to be undertaken by the Network. The current colposcopy-related performance measures and targets will be reviewed, revised and expanded. In addition, an HPV working group is currently drafting a guidance document to support provinces and territories if, in the future, they choose to develop business cases for primary HPV testing in their jurisdictions.

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Appendix A

Cervical Cancer Screening Programs in Canada

SNAPSHOT OF PROGRAM ELEMENTS	YT	NT	NU	BC	AB	SK
TYPE OF PROGRAM	Opportunistic	Opportunistic	Opportunistic	Partially organized	Organized	Organized (2009)
PROGRAM LAUNCHED/ ANNOUNCED			Screening guidelines and management of abnormal cytology results have been revised	1960	2003	2003
START SCREENING	Age 21 or 3 years after first sexual contact, whichever occurs first	Age 21 or 3 years after first sexual contact	Age 21 for women who are or have ever been sexually active	Age 21 or 3 years after first sexual contact, whichever occurs first	Age 21 or 3 years after becoming sexually active, whichever occurs later (under review)	Age 21 or 3 years after becoming sexually active, whichever occurs later
STOP SCREENING	Age 69 with 3 negative tests in previous 10 years or 3 annual negative tests (for women inadequately screened)	Age 69 with 3 negative tests in previous 10 years	Age 70 with 3 negative tests in previous 10 years	Age 69 with 3 negative tests in previous 10 years or 3 annual negative tests (for women inadequately screened)	Age 69 with 3 negative tests in previous 10 years or 3 annual negative tests (for women with no screening history)	Age 69 with 3 negative tests in previous 10 years or 3 annual negative tests (for women with no screening history)
SCREENING INTERVAL	Every 2 years after 3 consecutive annual negative tests	Every 2 years after 3 consecutive annual negative tests	Every 2 years after 3 consecutive annual negative tests	Every 2 years after 3 consecutive annual negative tests	Within 5 years, with 3 negative tests at least 12 months apart, and then continue every 3 years (under review)	Every 2 years until 3 consecutive negative tests, then every 3 years
POPULATION-BASED RECRUITMENT *	No	No	No	No	Yes	Yes
RESULT LETTERS TO WOMEN *	No	No	No	No; results to provider	Yes	Yes
REMINDERS FOR FOLLOW-UP AFTER ABNORMAL PAP TEST	Information currently not available	Yes, to care providers	No	Yes, to care providers only	Yes, care providers and/or women	Yes, to care providers only

MB	ON	QC	NB	NS	PE	NL
Organized (2010)	Partially organized	Opportunistic	Partially organized	Partially organized	Partially organized	Partially organized
2000	2000		2014	1991	2001	2003
Age 21 for women who have ever been sexually active	Age 21 for women who are or have ever been sexually active	Age 21	Age 21 or 3 years after becoming sexually active, whichever occurs later	Age 21 or within 3 years of first vaginal sexual contact, whichever occurs last	Age 21 if sexually active	Age 21
Age 70 with 3 negative tests in previous 10 years	Age 70 with adequate negative screening history in previous 10 years (i.e. 3 or more negative tests)	Age 65 with 2 negative tests in previous 10 years	Age 69 with history of adequate negative tests in previous 10 years or 3 annual negative tests for women with little or no screening history	Age 70 with adequate negative screening history in previous 10 years (i.e., 3 or more negative tests)	Age 65 with adequate normal Pap history in the previous 10 years (i.e., 3 or more negative results)	Age 70 with 3 negative tests in previous 10 years or 3 consecutive negative tests for women with no screening history
Every 3 years	Every 3 years	Every 2–3 years	Every 2–3 years after 3 consecutive annual negative tests	Every 3 years	Every 2 years	Every 3 years after 3 consecutive annual negative tests
Yes	Yes	No	Yes (since 2014)	No	No	No
By request from women only	Yes	No	No	Pap screen history by request	Yes, to women who are screened with the Provincial Screening Service	No
Yes, to care providers and women	Yes, to women only	No	Yes (as of spring 2016)	Yes, to care providers only	Yes	Yes, to care providers, then women

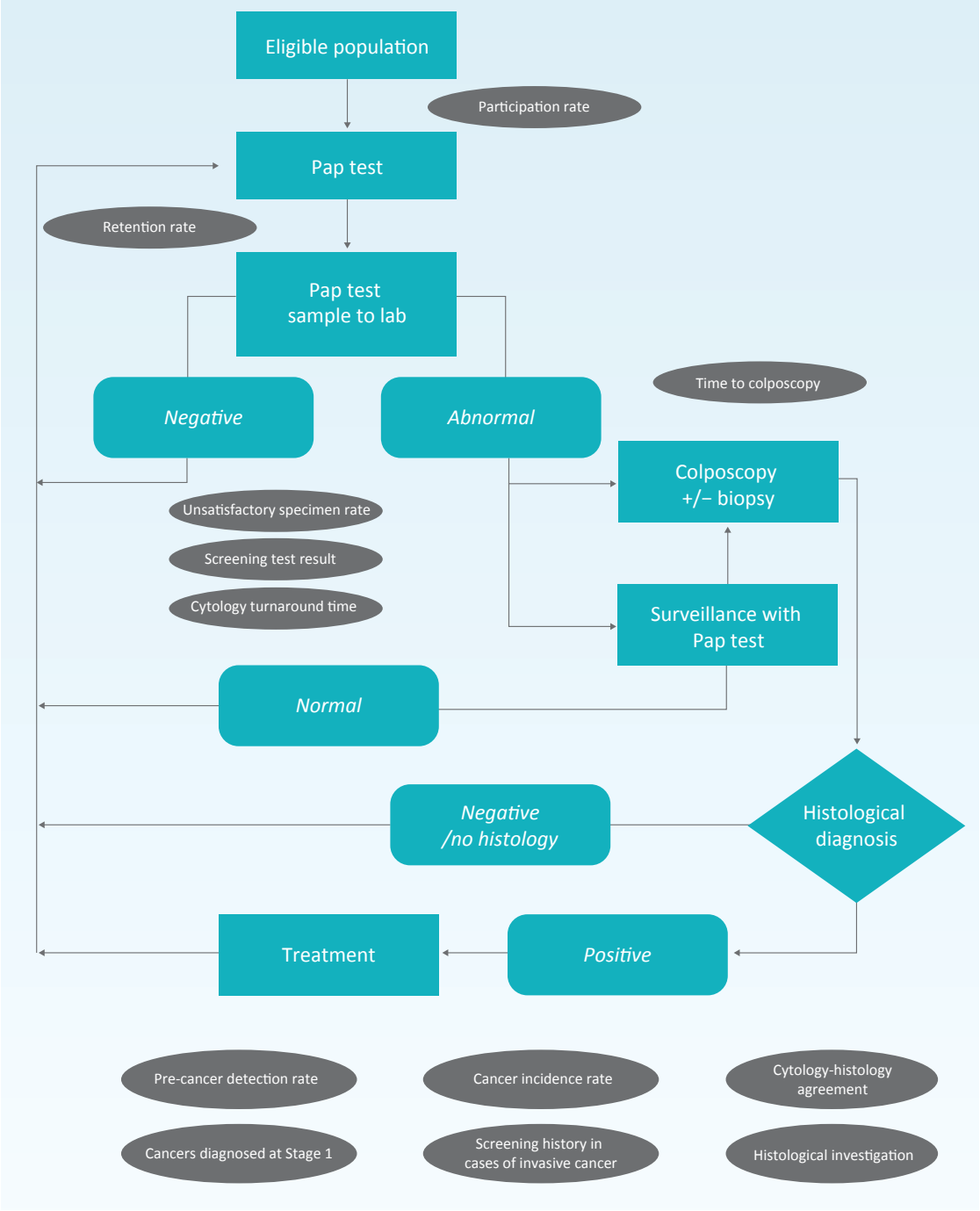
SNAPSHOT OF PROGRAM ELEMENTS	YT	NT	NU	BC	AB	SK
TYPE OF CYTOLOGY		Liquid-based	Liquid-based	Conventional	Liquid-based	Conventional
HPV TESTING FOR ASC-US TRIAGE OR FOR PRIMARY SCREENING	Neither	HPV triage for certain Pap test abnormalities	Reflex HPV ASC-US triage for women aged > 30		HPV triage for certain Pap test abnormalities	
ADMINISTRATION *						
TRACKING OF POSITIVE SCREENS AND APPROPRIATE FOLLOW-UP *				✓	✓	✓
RECALL SYSTEM TO HEALTH-CARE PROVIDERS FOR OVERDUE PAP TESTS *				✓	✓	✓
INFORMATION SYSTEMS *						
POPULATION-BASED *					✓	✓
CYTOLOGY *				✓	✓	✓
HISTOLOGY *				✓	✓	✓
COLPOSCOPY *				✓	✓	✓
QUALITY ASSURANCE						
SCREENING GUIDELINES *		✓ Revised March 2010		✓	✓	✓ Revised January 2012
PROGRAM REPORT WITH INDICATORS *				✓	✓	
TRAINING MANUALS *				✓		

	MB	ON	QC	NB	NS	PE	NL
	Liquid-based	Liquid-based	Both conventional and liquid-based	Both conventional and liquid-based	Conventional and one district who is piloting Liquid-based	Conventional	Liquid-based
		HPV triage recommended for certain Pap test abnormalities in women ≥ 30 (not an insured service)	HPV triage is available in 2 dedicated laboratories and is available for all ASCUS related cases in the province	HPV triage for certain Pap test abnormalities		HPV testing for ASC-US Triage for women ≥ 30	HPV triage for ASCUS in women>30 years of age since 2008
	ADMINISTRATION						
	✓	Underway			✓	✓	✓
	✓	✓ (to women, not providers)			✓	✓ Yes for overdue abnormal PAP tests	✓
	INFORMATION SYSTEMS						
	✓						
	✓	✓				✓	✓
	✓						✓
	✓						✓
	QUALITY ASSURANCE						
	✓ Revising	✓ Updating 2011	Proposed plan to implement 2011	Approved (adapted from AB & ON)	✓	✓ Revised 2013	✓
	✓	✓		✓	✓		✓
	✓	✓	Developing nursing screening tools		✓	✓	✓

* Last updated in 2013

Appendix B

Cervical Cancer Screening Pathway With Quality Indicators



Appendix C

Data Definitions

Indicator	Calculation	Notes
1. PARTICIPATION RATE **Definition:** Percentage of eligible women in the target population with at least one Pap test in a 3-year frame. **Target:** ≥ 80% of women 21 to 69 years of age should be screened within the recommended screening interval plus 6 months. **Measurement Timeframe:** 1a. January 1, 2010 to December 31, 2012 1b. January 1, 2010 to June 30, 2013 **Age groups:** 18-20, 21-24, 25-29, 30-39, 40-49, 50-59, 60-69, 70-74	**Numerator:** 1a. Number of women with at least one Pap test in a 3-year frame. 1b. Number of women with at least one Pap test in a 42 month time frame.	• Calculate age at Pap test date. • Use the first Pap test that occurs in the three year time frame. • Use the date the Pap test was performed. • If the date that the Pap test was performed is not available, use the date the Pap test was processed by the lab. • Do not exclude women who have had a cervical cancer diagnosis. • Exclude women who have had a hysterectomy if possible and note methodology when submitting data.
	Denominator: Number of women in the target population. Please provide hysterectomy corrected number. If unable to do so, CPAC will estimate this number. 1a&b. Number of women in the target population on June 30, 2011	• Define population using Statistics Canada population estimates at the mid-point of each time frame. • Calculate age-specific rates. • Calculate age-standardized rate for the 21- 69 age group standardized to the 2011 Canadian population. • Do not exclude women who have had a cervical cancer diagnosis. • Exclude women who have had a hysterectomy if possible.
2. RETENTION RATE **Definition:** Percentage of eligible women re-screened within 3 years after a negative Pap test in a 12-month time frame. **Target:** None **Measurement Timeframe:** Include women who had a negative Pap test from: January 1, 2009 to December 31, 2009 and January 1, 2010 to December 31, 2010 With follow-up for 3 years (36 months) and 42 months from the date of the Pap test **Age groups:** 21-29, 30-39, 40-49, 50-59, 60-66	**Numerator:** 2a. Number of women who have a subsequent Pap test within 3 (36 months) years of the index test with a negative result. 2b. Number of women who have a subsequent Pap test within 42 months of the index test with a negative result	• The index Pap test is the last negative Pap test in the 12 month index frame. • Use the date the Pap test was performed. If the date that the Pap test was performed is not available, use the date the Pap test was processed by the lab. • Calculate age using the date that the index Pap test with a negative result was performed.
	Denominator: Number of women with a negative Pap test in a 12-month frame.	• 12-month timeframe is defined as January 1, 2009 to December 31, 2009 and January 1, 2010 to December 31, 2010.

Indicator	Calculation	Notes
3. UNSATISFACTORY SPECIMEN RATE **Definition:** Percentage of test results that are reported as unsatisfactory in a 12 month frame **Target:** 0.5 to ≤ 2% **Measurement Timeframe:** January 1, 2012 to December 31, 2012 January 1, 2013 to December 31, 2013. **Age groups:** 21-29, 30-39, 40-49, 50-59, 60-69	**Numerator:** Number of Pap tests with an unsatisfactory result.	• Count each unsatisfactory Pap test because this indicator is Pap test not woman based. • Calculate age using the date the unsatisfactory Pap test was performed. If more than one Pap test was unsatisfactory, calculate age at the time of each Pap test. Unsatisfactory should not include rejected or unlabeled slides. • Use the date the Pap test was performed. • Identify whether or not cytology is conventional or LBC. • If both conventional and LBC are used, separate results by type of cytology. • If type of cytology is unknown, complete unknown cytology category.
	Denominator: Total number of Pap tests.	• The total number of Pap tests for each year – some women will have more than one Pap test in each year.
4. SCREENING TEST RESULTS **Definition:** Percentage of women by their most severe Pap test result in a 12 month frame. **Target:** None **Measurement Timeframe:** January 1, 2012 to December 31, 2012 January 1, 2013 to December 31, 2013 **Age groups:** 21-29, 30-39, 40-49, 50-59, 60-69	**Numerator:** Number of women with a negative, ASCUS, LSIL, AGC, ASC-H, HSIL or more severe Pap test result.	• Count the number of women. • Use the date the index Pap test was performed with the most severe result in that year. • Define severity as Negative < ASCUS < LSIL<AGC < ASC-H < HSIL or more severe. • Use the cytology diagnostic category map. • If there are two Pap tests of the same severity, choose the first. • Calculate age using the date the Pap test was performed that had the most severe result. • For SK, the Pap test result categories are abnormal low and abnormal high.
	Denominator: Total number of women with a satisfactory Pap test result.	• Count the most severe satisfactory Pap test

Indicator	Calculation	Notes
5. CYTOLOGY TURNAROUND TIME **Definition:** Percentage of tests for which the time between the date the Pap test is performed to the date the Pap test is processed by the laboratory (the date on the lab report) is ≤ 14 days **Target:** 90% within 14 calendar days **Measurement Timeframe:** January 1, 2010 to December 31, 2010 January 1, 2011 to December 31, 2011 January 1, 2012 to December 31, 2012 January 1, 2013 to December 31, 2013 **Age groups:** 21 to 69 years of age (not collected by 10-year age groups)	**Numerator:** Number of tests for which the time between the date the Pap test is performed to the date the Pap test is processed by the laboratory (the date on the lab report) is ≤ 14 days 5b. number of days at which the 90th percentile is reached (i.e., the number of days that 90% of tests take to be processed)	• Include unsatisfactory Pap tests.
	Denominator: The total number of Pap tests during the time frame.	
6. TIME TO COLPOSCOPY **Definition:** Percentage of women with a high-grade Pap test result (AGC, ASC-H, HSIL+) who had a follow-up colposcopy within 6 weeks of the index Pap test report date. **Target:** 90% of women with a high-grade Pap test result should have a colposcopy within six weeks from the Pap test report date. **Measurement Timeframe:** January 1, 2011 to December 31, 2011 January 1, 2012 to December 31, 2012 January 1, 2013 to December 31, 2013 **Age groups:** 21-29, 30-39, 40-49, 50-59, 60-69	**Numerator:** 6a. Number of women with a high-grade Pap test result (AGC, ASC-H, HSIL+) who had a follow-up colposcopy within 6 weeks of the index Pap test report date. 6b. Number of days at which the 90th percentile is reached. (Note: only women with a high-grade Pap test result (AGC, ASC-H, HSIL+) **AND** a follow-up colposcopy within 1 year of the index Pap test report date are included; exclude women who had a colposcopy within 7 days of the specimen date of the index pap test)	• Calculate the woman's age at the high-grade Pap test specimen date. • The Pap test specimen date should be in the calendar year of interest but the colposcopy can be performed in the next calendar year. • The colposcopy date is the date the first colposcopy is performed after the high-grade pap test report date. • Exclude all women who had a colposcopy performed within 7 days of the date the Pap test was performed (i.e., Pap test specimen date) because these are most likely based on clinical findings. • If a woman has more than one Pap test with an AGC, ASC-H, or HSIL+ result in the time frame, use the most severe Pap test. • If a woman has more than one "most severe Pap test" (i.e., two AGC Pap tests, two ASC-H Pap tests, or two HSIL Pap tests), use the first Pap test report date in the time frame.
	Denominator: 6a. Number of women with a high-grade Pap test result (AGC, ASC-H, HSIL+)	• Beginning with the women who had a high-grade Pap test from the numerator in indicator 4, we will have women who had a high-grade Pap test who had a colposcopy within 7 days of the Pap test, women who had a high-grade Pap test who had a colposcopy greater than 7 days after the Pap test, and women who had a high-grade Pap test who did not have a colposcopy. • For this denominator, we need to exclude the women who had a high-grade Pap test in the 12 month frame who had a colposcopy that was performed within 7 days of the date the high-grade Pap test. • If we do not exclude these women from the denominator, it will appear that these women were not followed-up and the rate will be artificially low. • This means that the women excluded from the numerator are also excluded from the denominator.

Indicator	Calculation	Notes
7. PERCENTAGE OF WOMEN WHO HAD A HISTOLOGICAL INVESTIGATION **Definition:** Percentage of women with a high-grade Pap test result (ASC-H or HSIL+) who had a colposcopy and histology within 12 months of the Pap test. **Target:** None **Measurement Timeframe:** January 1, 2011 to December 31, 2011 January 1, 2012 to December 31, 2012 January 1, 2013 to December 31, 2013 **Age groups:** 21-29, 30-39, 40-49, 50-59, 60-69	**Numerator:** Number of women with a histologic investigation within 12 months of the ASC-H/ HSIL+ cytological finding.	• Use the date the Pap test with an ASC-H /HSIL+ finding was performed. • The Pap test should be performed in the calendar year of interest but the biopsy can be performed in the next calendar year. • Calculate the woman's age at the date the Pap test with the ASC-H /HSIL+ result was performed. • A histological investigation includes any cervical pathology report (including cervical, vaginal, and endo-cervical). • Include women who had a biopsy without histological result. • If biopsy is performed within 7 days of the Pap test, exclude.
	Denominator: 7a. Number of women with a cytological finding of ASC-H/ HSIL+ in a 12 month frame. 7b. Number of women who had a colposcopy within 12 months of a Pap test with an ASC-H/ HSIL+ result.	• If biopsy is performed within 7 days of the Pap test, exclude. The rationale is the same as for indicator number 6.
8. CYTOLOGY-HISTOLOGY AGREEMENT **Definition:** Proportion of positive Pap tests with histological work-up found to have a pre-cancerous lesion or an invasive cancer in a 12 month frame. **Target:** ≥ 65% of high-grade Pap tests (HSIL+ cytology result) should have a pre-cancerous, carcinoma in situ, or an invasive cancer histological outcome. **Measurement Timeframe:** January 1, 2011 to December 31, 2011 January 1, 2012 to December 31, 2012 January 1, 2013 to December 31, 2013 **Age groups:** 21-29, 30-39, 40-49, 50-59, 60-69	**Numerator:** 8a. Number of Pap tests with ASC-H results that have a histological confirmation of HSIL, carcinoma in situ, or invasive carcinoma within 12 months of the ASC-H Pap test. 8b. Number of Pap tests with an HSIL+ result that have a histological confirmation of HSIL, carcinoma in situ, or invasive carcinoma within 12 months of the HSIL+ Pap test.	• Use the date the Pap test with the ASC-H only or HSIL+ result was performed. • The Pap test should be performed in the calendar year of interest but the biopsy can be performed in the next calendar year. • Use the cytology diagnostic category map (refer to Appendix A at end of document). • If a woman has more than one histological result in the time frame, use the more severe histology outcome. For updated histology terminology, see: Waxman AG, Chemmlow D, Darrragh TM, Lawson H, Moscicki A-B. Revised Terminology for Cervical Histopathology and Its Implications for Management of High-Grade Squamous Intraepithelial Lesions of the Cervix. Obstet Gynecol 2012;120:1465–71. DOI: http://10.1097/AOG.0b013e31827001d5 CIN 1 now reported as LSIL. CIN 2 (moderate dysplasia) now reported as HSIL. CIN 3 (severe dysplasia) now reported as HSIL.
	Denominator: 8a. Number of Pap tests with an ASC-H result that have a histological work-up within 12 months of the ASC-H Pap test. 8b. Number of Pap tests with an HSIL+ result that have a histological work-up within 12 months of the HSIL+ Pap test.	• A histology result includes any cervical, vaginal, or endo-cervical histology result.

Indicator	Calculation	Notes
9. PRE-CANCER DETECTION RATE **Definition:** Number of pre-cancerous lesions (squamous) detected per 1000 women who had a Pap test in the previous 12 months. **Target:** None **Measurement Timeframe:** January 1, 2011 to December 31, 2011 January 1, 2012 to December 31, 2012 January 1, 2013 to December 31, 2013 **Age groups:** 21-29, 30-39, 40-49, 50-59, 60-69	**Numerator:** Number of women with histology of HSIL.	• Use the most severe biopsy that was performed. • Year is defined by the Pap test date. • Use the age at the date the Pap test was performed. • Histology must occur within 12 months of the Pap test. • Include squamous carcinoma in situ
	Denominator: Number of women who had at least one Pap test.	• Use the date the Pap test was performed. Count each woman once. • If the woman had more than one Pap test, use the first Pap test.
10. CANCER INCIDENCE **Definition:** Age standardized incidence rate per 100,000 women of invasive cervical cancer diagnosed in a year **Target:** None **Measurement Timeframe:** January 1, 2011 to December 31, 2011 January 1, 2012 to December 31, 2012 January 1, 2013 to December 31, 2013 (if available) **Age groups:** 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80+. Data should be submitted so that incidence can be calculated for ages 30 to 69.	**Numerator:** 10a. Number of new cases of invasive cervical cancer – squamous cell carcinoma only 10b. Number of new cases of invasive cervical cancer – non-squamous cell carcinomas	• Invasive cervical cancers i.e. all cases with an ICD-O C53 topography code. • Separate squamous cell carcinoma from all other morphology types (adenocarcinoma, mixed, unclassified, unknown). • For squamous cell carcinomas, include all invasive histology codes that are within the histology range of squamous cell neoplasms (8050 to 8084). Because some of these histologies are unlikely to occur in the cervix, ICD-O topography code of C53 must also be specified. • The entire squamous cell neoplasia list is below: 8050/3 Papillary carcinoma, NOS (not otherwise specified) 8051/3 Verrucous carcinoma, NOS 8052/3 Papillary squamous cell carcinoma 8070/3 SCC, NOS 8071/3 Keratinizing 8072/3 Non-keratinizing 8073/3 SCC, small cell, non-keratinizing 8074/3 SCC, spindle cell 8075/3 SCC, adenoid 8076/3 SCC, micro invasive 8078/3 SCC with horn formation 8082/3 Lymhoepithelial carcinoma 8083/3 Basaloid scc 8084/3 SCC, clear cell type • Define age as the woman's age at diagnosis (pathology/biopsy).
	Denominator: Provincial population for each age group	• Age-standardized incidence rates should be calculated using the age distribution of the 2011 Canadian population. • Use Statistics Canada population data for consistency across the provinces and territories. • Define population using Statistics Canada population estimates at the mid-year.

Indicator	Calculation	Notes
11. PERCENTAGE OF CANCERS DETECTED AT STAGE I **Definition:** Percentage of invasive carcinoma of the cervix diagnosed at stage 1 in a 12 month (FIGO stage). **Target:** None **Measurement Timeframe:** January 1, 2011 to December 31, 2011 January 1, 2012 to December 31, 2012 January 1, 2013 to December 31, 2013 (if available) **Age groups:** 21-29, 30-39, 40-49, 50-59, 60-69 Data will be rolled up to provide a national percentage by age group.	**Numerator:** Number of invasive cervical cancers diagnosed at stage 1.	• Map TNM to FIGO (T1=I, T1A=IA, T1a1=IA1, T1a2=IA2, T1b=IB, T1b1=IB1, T1b2=IB2) before submission. • Define age as the woman's age at diagnosis (pathology/biopsy). • Invasive cervical cancers include squamous cell cancers, adenocarcinoma, adenosquamous, and not classified i.e. all cases with an ICD-O C53 topography code. • NOTE: stage data from the Canadian Cancer Registry may be available for this indicator for the third data submission.
	Denominator: Number of invasive cervical cancers.	

Indicator	Calculation	Notes
12. SCREENING HISTORY IN CASES OF INVASIVE CANCER **Definition:** Percentage of women with invasive cancer of the cervix by time since previous Pap test in a 12 month frame. **Target:** None **Measurement Timeframe:** January 1, 2011 to December 31, 2011 January 1, 2012 to December 31, 2012 January 1, 2013 to December 31, 2013 (if available) **Age groups:** 21 to 69 years of age. Data will be rolled up to provide a national percentage for each year	**Numerator:** a1. Number of women diagnosed with invasive cervical cancer – squamous cell carcinoma within >0.5 to 3 years since previous Pap test. a2. Number of women diagnosed with invasive cervical cancer – squamous cell carcinoma within >3 to 5 years since previous Pap test. a3. Number of women diagnosed with invasive cervical cancer – squamous cell carcinoma >5 years since previous Pap test (including women who have never had a Pap test). b1. Number of women diagnosed with invasive cervical cancer – non-squamous cell carcinomas within >0.5 to 3 years since previous Pap test. b2. Number of women diagnosed with invasive cervical cancer – non-squamous cell carcinomas within >3 to 5 years since previous Pap test. b3. Number of women diagnosed with invasive cervical cancer – non-squamous cell carcinomas >5 years since previous Pap test (including women who have never had a Pap test).	• Use the date the Pap test was performed as opposed to the date registered or analyzed. • Calculate age based on the date of diagnosis of invasive cervical cancer. • If a woman has multiple Pap tests prior to a diagnosis of cancer, use the most recent Pap test. • Use the following 6 categories: 1. 0 to 0.5 years = 0 days to 182 days 2. >0.5 to 3 years = 183 days to 1095 days 3. >3 years to 5 years = 1096 days to 1825 days 4. >5 years = 1826 days plus. 5. Never = no Pap test recorded. 6. Insufficient historical data. If a woman had a Pap test 0-0.5 years and a Pap test >0.5 to 3 years or >3 to 5 years or >5 years, use the >0.5-3 or >3-5 or >5 Pap test whichever comes first instead of the 0-0.5 year Pap test because we want screening history and we are assuming that the Pap test in the 0-0.5 year category is for diagnostic purposes. • Invasive cervical cancers i.e. all cases with an ICD-O C53 topography code. • Separate squamous cell carcinoma from all other morphology types (adenocarcinoma, mixed, unclassified, unknown). • See indictor 10 – cancer incidence for the definition of squamous cell carcinoma of the cervix.
	Denominator: a1-3. Total number of women diagnosed with invasive cervical cancer – squamous cell carcinoma. b1-3. Total number of women diagnosed with invasive cervical cancer – non-squamous cell carcinomas.	

Appendix D

Supplementary Tables

TABLE 1

Age-standardized percentage of women 21 to 69 years of age who had at least one Pap test from January 1, 2010 to June 30, 2013 (42-month period) by province and territory

Province/ Territory[†]	JAN 2010-JUN 2013			
	Type	Women who had a Pap test	Population	Percent (%)
ON	Hysterectomy-corrected	.	.	64.9
MB	Hysterectomy-corrected	261,558	367,028	70.8
BC	Hysterectomy-corrected	972,867	1,311,704	73.8
SK	Non-hysterectomy-corrected	206,645	326,907	62.9
NB	Non-hysterectomy-corrected	159,189	251,981	64.5
NS	Non-hysterectomy-corrected	210,147	319,113	67.2
NT	Non-hysterectomy-corrected	9,623	13,715	67.2
PE	Non-hysterectomy-corrected	31,445	47,543	67.4
AB	Non-hysterectomy-corrected	842,909	1,226,056	67.7
NL	Non-hysterectomy-corrected	126,187	180,287	71.3

[†]New Brunswick and Ontario include data from January 2011 to June 2014. Age standardized to the 2011 Canadian population.

TABLE 2

Percentage of women who had at least one Pap test from January 1, 2010 to June 30, 2013 (42-month period) by age group

			HYSTERECTOMY-CORRECTED			NON-HYSTERECTOMY-CORRECTED		
Province/ Territory[†]	Period	Age group	Women who had a Pap test	Population	Percent (%)	Women who had a Pap test	Population	Percent (%)
Provinces/ Territories Combined	2010-Jun 2013	21-69	1,234,425	1,678,732	73.5	1,586,145	2,365,602	67.1
		21-24	109,918	156,849	70.1	154,241	203,229	75.9
		25-29	156,241	202,676	77.1	212,494	265,913	79.9
		30-39	289,749	378,224	76.6	378,672	496,341	76.3
		40-49	290,580	376,156	77.2	358,169	521,801	68.6
		50-59	247,565	344,521	71.9	313,048	522,224	59.9
		60-69	140,372	220,306	63.7	169,521	356,094	47.6

[†]Hysterectomy-corrected includes Manitoba and British Columbia. Non-hysterectomy-corrected includes Alberta, Saskatchewan, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador and Northwest Territories.

TABLE 3

Age-standardized percentage of women 21 to 69 years of age who had at least one Pap test in a 3-year period by province and territory from 2004-2006 to 2010-2012

Province/ Territory[†]	2004-2006			2005-2007		
	Women who had a Pap test	Population	Percent (%)	Women who had a Pap test	Population	Percent (%)
BC	912,360	1,241,562	73.3	924,715	1,257,610	73.4
AB	314,652	426,276	74.3	330,280	441,013	75.4
SK	199,601	304,148	67.6	197,516	305,676	66.7
MB	256,913	367,793	71.1	258,999	370,564	71.2
ON	.	.	.	.	.	.
NB	.	.	.	.	.	.
NS	230,405	317,916	74.9	229,373	319,642	74.5
PE	.	.	.	.	.	.
NL	120,760	177,728	70.9	120,895	177,323	71.4
NT	.	.	.	.	.	.

Province/ Territory[†]	2006-2008			2007-2009		
	Women who had a Pap test	Population	Percent (%)	Women who had a Pap test	Population	Percent (%)
BC	936,585	1,278,778	73.2	918,997	1,304,197	70.5
AB	345,214	457,185	76.0	352,176	471,330	75.3
SK	197,488	309,601	65.9	200,359	314,772	65.8
MB	261,365	374,889	71.1	250,678	346,813	72.7
ON	.	.	.	.	.	.
NB	.	.	.	.	.	.
NS	225,360	320,722	73.1	219,304	322,241	72.2
PE	.	.	.	.	.	.
NL	124,068	176,658	73.9	126,342	177,088	75.3
NT	.	.	.	.	.	.

[†]British Columbia provided hysterectomy corrected rates for all years. Manitoba provided hysterectomy corrected rates for 2007 to 2012. All other provinces did not provide hysterectomy corrected rates. Ontario provided data for women 20-69 years of age. New Brunswick provided data for 2010-2012. Prince Edward Island and Ontario provided data for 2009-2012. Alberta provided data for two health regions for 2006 to 2009 and data for the entire province from 2010 to 2012. Age standardized to the 2011 Canadian population.

TABLE 3

Age-standardized percentage of women 21 to 69 years of age who had at least one Pap test in a 3-year period by province and territory from 2004-2006 to 2010-2012

Province/ Territory[†]	2008-2010			2009-2011		
	Women who had a Pap test	Population	Percent (%)	Women who had a Pap test	Population	Percent (%)
BC	934,573	1,331,247	70.3	940,023	1,356,113	69.5
AB	357,635	490,972	73.3	356,253	507,215	70.8
SK	202,511	321,182	65.2	204,696	327,437	64.6
MB	252,705	355,941	71.4	254,268	364,910	70.1
ON	.	.	.	.	.	64.9
NB	.	.	.	.	.	.
NS	216,190	324,341	70.8	214,005	326,984	69.5
PE	.	.	.	31,658	47,914	69.4
NL	127,649	178,309	75.6	126,306	179,810	74.4
NT	.	.	.	.	.	.

Province/ Territory[†]	2010-2012		
	Women who had a Pap test	Population	Percent (%)
BC	927,413	1,311,704	70.4
AB	787,121	1,226,056	63.2
SK	195,505	326,907	59.5
MB	249,200	367,028	67.5
ON	2,807,162	4,374,768	63.9
NB	152,032	251,981	61.6
NS	200,995	319,113	64.3
PE	29,937	47,543	64.1
NL	121,452	180,287	68.7
NT	9,074	13,715	63.2

[†]British Columbia provided hysterectomy corrected rates for all years. Manitoba provided hysterectomy corrected rates for 2007 to 2012. All other provinces did not provide hysterectomy corrected rates. Ontario provided data for women 20-69 years of age. New Brunswick provided data for 2010-2012. Prince Edward Island and Ontario provided data for 2009-2012. Alberta provided data for two health regions for 2006 to 2009 and data for the entire province from 2010 to 2012. Age standardized to the 2011 Canadian population.

TABLE 4

Percentage of women 21 to 66 years of age who had a subsequent Pap test within 42-month of an index Pap test with a negative result by province and territory, 2009-2010

	2009-2010		
Province/Territory	Re-screen	Pap test	Percent (%)
NT	7,475	9,751	76.7
SK	150,487	194,382	77.4
PE	25,534	32,485	78.6
BC	677,518	858,634	78.9
NL	115,391	142,785	80.8
MB	224,631	276,686	81.2
NS	182,777	224,581	81.4
ON	2,088,609	2,547,414	82.0

TABLE 5

Percentage of women who had a subsequent Pap test within 42-month of an index Pap test with a negative result by age group, provinces and territories combined, 2009-2010

	2009-2010			
Province/Territory[†]	Age group	Re-screen	Pap test	Percent (%)
Provinces/Territories Combined	21-66	3,472,422	4,286,718	81.0
	21-29	303,479	376,865	80.5
	30-39	329,632	414,338	79.6
	40-49	335,762	424,244	79.1
	50-59	289,420	362,474	79.8
	60-66	125,520	161,383	77.8

[†]Includes Northwest Territories, Saskatchewan, Prince Edward Island, British Columbia, Newfoundland and Labrador, Manitoba, Nova Scotia, and Ontario.

TABLE 6

Percentage of unsatisfactory Pap test results for women 21 to 69 years of age by province and territory, 2012-2013

Type of tests	Province/Territory†	2012-2013		
		Unsatisfactory tests	Total number of Pap tests	Percent (%)
Conventional	NS	1,517	222,862	0.7
	NB	1,388	120,532	1.2
	SK	2,914	189,014	1.5
	BC	18,720	963,808	1.9
	MB	7,643	278,142	2.7
	PE	1,561	31,287	5.0
LBC	NS	*	*	*
	NB	63	34,697	0.2
	NT	37	9,070	0.4
	NL	742	132,460	0.6
	ON	7,916	1,319,995	0.6
	AB	11,549	832,877	1.4

*Suppressed due to small numbers.
†Ontario provided data for women 20-69 years of age and for 2012 only.

TABLE 7

Percentage of women 21 to 69 years of age by the most severe abnormal Pap test result by province and territory, 2012-2013

Province/ Territory†	Satisfactory Pap tests	ASC-US		LSIL		AGC		ASC-H		HSIL+	
		Women	Percent (%)	Women	Percent (%)	Women	Percent (%)	Women	Percent (%)	Women	Percent (%)
BC	926,305	14,854	1.6	10,723	1.2	2,273	0.2	2,534	0.3	5,965	0.6
PE	27,713	448	1.6	281	1.0	61	0.2	136	0.5	176	0.6
NT	8,501	234	2.8	60	0.7	0	0.0	24	0.3	13	0.2
SK	174,990	3,176	1.8	2,225	1.3	178	0.1	521	0.3	1,174	0.7
AB	781,213	12,622	1.6	17,586	2.3	651	0.1	2,874	0.4	3,661	0.5
ON	1,244,761	35,158	2.8	26,110	2.1	588	0.0	2,307	0.2	4,038	0.3
MB	248,649	6,660	2.7	4,298	1.7	402	0.2	655	0.3	2,578	1.0
NS	204,814	8,320	4.1	3,095	1.5	442	0.2	1,281	0.6	915	0.4
NL	118,999	4,470	3.8	4,587	3.9	354	0.3	473	0.4	579	0.5
NB	67,177	5,429	8.1	2,467	3.7	863	1.3	567	0.8	519	0.8

†Data from Ontario includes only 2012 for women 20 to 69 years of age. The HSIL+ category includes AIS.

TABLE 8

Percentage of women by most severe abnormal Pap test result, by age group, provinces and territories combined, 2012-2013

Province/ Territory[†]	Age group	Satisfactory Pap tests	ASC-US		LSIL		AGC		ASC-H		HSIL+	
			Women	Percent (%)	Women	Percent (%)	Women	Percent (%)	Women	Percent (%)	Women	Percent (%)
Provinces/ Territories Combined	21-69	3,803,122	91,371	2.4	71,432	1.9	5,812	0.2	11,372	0.3	19,618	0.5
	21-29	854,873	37,547	4.4	39,995	4.7	677	0.1	4,931	0.6	8,934	1.0
	30-39	907,954	20,592	2.3	16,306	1.8	1,096	0.1	3,160	0.3	6,012	0.7
	40-49	857,378	17,315	2.0	9,327	1.1	1,707	0.2	1,812	0.2	2,876	0.3
	50-59	758,449	11,296	1.5	4,366	0.6	1,631	0.2	1,031	0.1	1,211	0.2
	60-69	424,137	4,387	1.0	1,378	0.3	701	0.2	414	0.1	572	0.1

[†]Includes British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador, and Northwest Territories. Data from Ontario includes only 2012 for women 20 to 69 years of age. The HSIL+ category includes AIS. The age group 21-69 includes the Northwest Territories but all other age groups do not.

TABLE 9

Cytology turnaround time measured as the percentage less than 14 calendar days and the number of days at which the 90th percentile was reached by province and territory, 2011, 2012, and 2013

Province	Age group	2011				2012				2013			
		Number of women	AGC/ ASC-H/ HSIL+	Percent (%) under 14 days	90th percentile (days)	Number of women	AGC/ ASC-H/ HSIL+	Percent (%) under 14 days	90th percentile (days)	Number of women	AGC/ ASC-H/ HSIL+	Percent (%) under 14 days	90th percentile (days)
BC	21-69	46,031	487,851	9.4	36	170,491	489,070	34.9	26	472,409	491,442	96.1	12
SK	21-69	65,868	108,714	60.6	23	72,775	96,677	75.3	22	51,234	92,337	55.5	26
MB	21-69	93,603	159,897	58.5	26	102,883	154,786	66.5	27	104,158	122,080	85.3	17
NB	21-69	21,783	96,321	22.6	63	27,905	81,695	34.2	44	16,616	73,154	22.7	49
NS	21-69	25,963	126,350	20.5	80	50,388	116,423	43.3	47	46,352	107,995	42.9	44
NL	21-69	79,198	85,857	92.2	33	69,702	75,506	92.3	18	61,041	66,804	91.4	16

TABLE 10

Percentage of women 21 to 69 years of age with a high-grade Pap test result (AGC/ASC- H/HSIL+) who had follow-up colposcopy within 6 weeks of the index Pap test by province and territory, 2011, 2012, and 2013

Province[†]	Number of women	AGC/ASC-H/HSIL+	Percent (%)
BC	2,880	15,001	19.2
AB	860	3,648	23.6
MB	1,166	3,751	31.1
NS	1,021	3,932	26.0
NL	608	2,275	26.7

[†]HSIL+ includes adeno in-situ, carcinoma, squamous cell carcinoma, adenocarcinoma and other malignancies. Women who had a definitive cervical treatment were also included if a follow-up colposcopy was not found. Alberta provided data for 2012.

TABLE 11

Number of days at which the 90th percentile is reached for women with a high-grade Pap test result who had follow-up colposcopy by age group and province and territory, 2013

Province†	Age group	2013			
		Number of women	AGC/ASC-H/ HSIL+	Percent (%) under 6 weeks	90th percentile (in days)
BC	21-29	294	1,496	19.7	253
	30-39	266	1,220	21.8	229
	40-49	174	946	18.4	231
	50-59	62	531	11.7	224
	60-69	25	191	13.1	232
AB	21-29	403	1,675	24.1	247
	30-39	241	1,052	22.9	257
	40-49	137	515	26.6	244
	50-59	55	274	20.1	230
	60-69	24	132	18.2	237
MB	21-29	109	484	22.5	224
	30-39	95	297	32.0	210
	40-49	49	145	33.8	227
	50-59	39	129	30.2	197
	60-69	17	69	24.6	138
NS	21-29	126	559	22.5	190
	30-39	105	391	26.9	167
	40-49	70	233	30.0	161
	50-59	42	156	26.9	185
	60-69	22	81	27.2	152
NL	21-29	40	193	20.7	161
	30-39	46	156	29.5	143
	40-49	24	102	23.5	149
	50-59	30	89	33.7	161
	60-69	12	46	26.1	150

†HSIL+ includes adeno in-situ, carcinoma, squamous cell carcinoma, adenocarcinoma and other malignancies. Women who had a definitive cervical treatment were also included if a follow-up colposcopy was not found. Alberta provided data for 2012. Ontario provided data for women with high-grade Pap test results who had follow-up colposcopy or definitive treatment within 6 months of the index Pap test (21-29: 82%, 30-39: 84.5%, 40-49: 83.6%, 50-59: 80.5%, 60-69: 81.8%).

TABLE 12

Percentage of Pap tests with ASC-H/HSIL+ results investigated with a biopsy that had a histological diagnosis of ASC-H/HSIL+ within 12 months of the Pap test for women 21 to 69 years of age by provinces and territory, 2011, 2012, and 2013

	ASC-H			HSIL+		
Province[†]	Histology	Cytology	Percent (%)	Histology	Cytology	Percent (%)
BC	1,113	3,671	30.3	3,878	7,704	50.3
AB	1,810	3,132	57.8	2,394	3,531	67.8
MB	439	1,100	39.9	2,613	3,827	68.3
NS	631	1,652	38.2	596	1,256	47.5
PE	74	194	38.1	258	325	79.4
NL	241	753	32.0	665	933	71.3

[†]Alberta includes data for 2012 and 2013.

TABLE 13

Percentage of Pap tests with ASC-H/HSIL+ results investigated with a biopsy that had a histological diagnosis of ASC-H/HSIL+ within 12 months of the Pap test by age group, provinces combined, 2011, 2012, and 2013

		ASC-H			HSIL+		
Province[†]	Age group	Histology	Cytology	Percent (%)	Histology	Cytology	Percent (%)
Provinces Combined	21-69	4,308	10,502	41.0	10,404	17,576	59.2
	21-29	2,162	4,642	46.6	4,844	8,124	59.6
	30-39	1,361	3,007	45.3	3,469	5,583	62.1
	40-49	516	1,675	30.8	1,392	2,522	55.2
	50-59	200	857	23.3	467	933	50.1
	60-69	69	321	21.5	232	414	56.0

[†]Includes British Columbia, Alberta, Manitoba, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador. Alberta includes data for 2012 and 2013.

TABLE 14

Percentage of women 21 to 69 years of age with an ASC-H or HSIL+ Pap test result that received a histological diagnosis within 12 months of the Pap test by province and territory, 2011, 2012 and 2013

Province[†]	2011-2013		
	Number of women with a histological investigation	Number of women with an ASC-H or HSIL+ Pap test result	Percent (%)
AB	4,279	6,531	65.5
NL	1,336	1,868	71.5
MB	2,388	3,233	73.9
NS	2,568	3,236	79.4
BC	9,515	11,837	80.4
PE	409	500	81.8

[†]Alberta includes data from 2012 and 2013.

TABLE 15

Percentage of women 21 to 69 years of age with an ASC-H or HSIL+ Pap test result that had a colposcopy and received a histological diagnosis within 12 months of the Pap test by province and territory, 2011, 2012, 2013

Province[†]	2011-2013		
	Number of women with a histological investigation	Number of women who had a colposcopy within 12 months of an ASC-H or HSIL+ Pap test result	Percent (%)
NL	1,336	1,824	73.2
AB	4,279	5,414	79.0
MB	2,388	2,732	87.4
NS	2,568	2,906	88.4
BC	9,515	10,136	93.9

[†]Alberta includes data from 2012 and 2013.

TABLE 16

Number of women diagnosed with a pre-cancerous lesion per 1,000 women screened, by province and age group, 2011, 2012, and 2013

Province[†]	Age group	2011-2013		
		Women with histology of HSIL	Women who had at least one Pap test	Rate per 1,000 women
BC	21-29	2,777	284,279	9.8
	30-39	2,005	326,875	6.1
	40-49	918	320,607	2.9
	50-59	331	287,074	1.2
	60-69	157	166,070	0.9
AB	21-29	2,797	193,506	14.5
	30-39	1,729	204,078	8.5
	40-49	633	167,067	3.8
	50-59	178	149,069	1.2
	60-69	60	74,362	0.8
MB	21-29	1,981	89,663	22.1
	30-39	1,095	91,312	12.0
	40-49	477	85,184	5.6
	50-59	200	80,318	2.5
	60-69	107	49,691	2.2
NS	21-29	613	69,073	8.9
	30-39	404	71,561	5.6
	40-49	177	72,306	2.4
	50-59	86	66,048	1.3
	60-69	45	39,977	1.1
PE	21-29	104	9,715	10.7
	30-39	78	9,757	8.0
	40-49	39	9,909	3.9
	50-59	11	9,431	1.2
	60-69	7	6,294	1.1
NL	21-29	371	43,345	8.6
	30-39	291	41,872	6.9
	40-49	91	44,148	2.1
	50-59	38	40,411	0.9
	60-69	20	25,539	0.8

[†]Alberta includes data from 2012 and 2013.

TABLE 17

Age-standardized invasive cervical cancer incidence rate per 100,000 women by province and territory, age 20 and over, 2011, 2012, and 2013*

	NON-SQUAMOUS CELL CARCINOMA			SQUAMOUS CELL CARCINOMA		
Province†	Population	Cases	Age-standardized incidence rate	Population	Cases	Age-standardized incidence rate
BC	3,618,582	97	2.7	3,618,582	251	6.9
AB	4,356,901	126	2.9	4,356,901	298	6.9
SK	1,217,626	42	3.5	1,217,626	90	7.7
MB	1,415,487	66	4.7	1,415,487	85	6.1
NB	918,522	31	3.3	918,522	50	5.5
NS	1,161,954	43	3.6	1,161,954	91	8.0
PE	174,782	8	4.3	174,782	10	5.8
NL	644,865	25	3.9	644,865	53	8.2

†British Columbia includes data from 2011 and 2012. Age standardized to the 2011 Canadian population.

*Updated July, 2016

TABLE 18

Age-standardized invasive cervical cancer incidence rate per 100,000 women by age group, 2011, 2012, and 2013, provinces combined*

		NON-SQUAMOUS CELL CARCINOMA			SQUAMOUS CELL CARCINOMA		
Province†	Age group	Population	Cases	Age-standardized incidence rate	Population	Cases	Age-standardized incidence rate
Provinces Combined	20-24	1,190,519	7	0.6	1,190,519	14	1.2
	25-29	1,252,296	34	2.7	1,252,296	53	4.2
	30-34	1,213,945	34	2.8	1,213,945	105	8.6
	35-39	1,157,438	62	5.4	1,157,438	101	8.7
	40-44	1,186,120	58	4.9	1,186,120	137	11.6
	45-49	1,286,253	46	3.6	1,286,253	102	7.9
	50-54	1,331,534	39	2.9	1,331,534	100	7.5
	55-59	1,201,045	42	3.5	1,201,045	94	7.8
	60-64	1,020,627	32	3.1	1,020,627	65	6.4
	65-69	788,018	26	3.3	788,018	45	5.7
	70-74	589,649	21	3.6	589,649	39	6.6
	75-79	471,422	10	2.1	471,422	23	4.9
	80+	819,853	27	3.3	819,853	50	6.1

†Includes British Columbia, Alberta, Saskatchewan, Manitoba, New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador. British Columbia includes data from 2011 and 2012. Age standardized to the 2011 Canadian population.

*Updated July, 2016

TABLE 19

Percentage of invasive cervical cancers detected at stage I, by province, for women 21 to 69 years of age, 2011, 2012, and 2013*

Province†	2011-2013		
	Stage I	Number of cancers	Percent (%)
SK	53	115	46.1
AB	194	379	51.2
MB	70	129	54.3
NS	65	114	57.0
BC	176	303	58.1
NL	42	65	64.6
PE	13	16	81.3

†British Columbia includes data from 2011 and 2012.

TABLE 20

Screening history for women 21 to 69 years of age diagnosed with invasive cervical cancer by histology, 2011, 2012, and 2013, provinces combined*

Province†	Type	Total Cases	0-0.5 YEAR		>0.5-3 YEARS		>3-5 YEARS		>5 YEARS OR NEVER	
			Cases	Percent (%)	Cases	Percent (%)	Cases	Percent (%)	Cases	Percent (%)
Provinces Combined	Non-squamous cell carcinoma	380	101	26.6	145	38.2	21	5.5	113	29.7
	Squamous cell carcinoma	821	274	33.4	197	24.0	46	5.6	304	37.0

†Includes British Columbia, Alberta, Saskatchewan, Manitoba, New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador. British Columbia includes data from 2011 and 2012.

*Updated July, 2016

TABLE 21

Percentage of women 18 to 20 years of age who had at least one Pap test in a 42-month period by province and territory, January 1, 2010 to June 30, 2013

Province/ Territory[†]	JAN 2010-JUN 2013		
	Women who had a Pap test	Population	Percent (%)
TOTAL	149,516	254,329	58.8
AB	37,348	75,825	49.3
NB	7,377	14,203	51.9
BC	47,228	83,564	56.5
MB	16,956	27,051	62.7
NT	742	1,126	65.9
SK	14,623	21,916	66.7
NL	6,757	9,446	71.5
PE	2,162	3,005	71.9
NS	16,323	18,193	89.7

[†]New Brunswick includes data from January 1, 2011 to June 30, 2014.

Appendix E

Cancer Risk Management Model Key Assumptions and Definitions

Descriptor	Assumption/Definition
Pap test participation rate[a]	56%
Initial participation rate	91%
Rescreen rate	70%
Screening interval	3 years
Low-grade abnormal	ASC-US, ASC-H, LSIL
High-grade abnormal	HSIL
Cost of Pap test (initial screening and re-test)	$59.49
Initial colposcopy (without biopsy)	$955.71
Re-assessment colposcopy within 6 months (without biopsy)	$724.00
Re-assessment colposcopy not within 6 months (without biopsy)	$656.23
Biopsy	$102.71
Cold knife	$1851.23
Loop electrosurgical excision procedure (LEEP)	$1887.19
Cryosurgery[b]	$1887.19
Laser[b]	$1887.19
Hysterectomy	$3068.01
HPV vaccination rate	70% (initiating in 12 year-old females in 2007)
HPV vaccine efficacy	100%, with no waning

Notes: Model version 2.2, linked with HPV Model version 1.8. Currency year 2008, Canadian dollars.

a) The Pap test participation rate of 56% is defined as the percentage of women who had at least one Pap test in the previous three years and is based on initial participation and retention rates as well as the interaction of these rates with other model variables such as the screening interval and the follow-up of abnormal Pap tests.

b) Assumed same cost as LEEP as simplifying assumption (Dr. Laurie Elit, November, 2012).

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