The 2016 Cancer System Performance Report

July 2016

Technical Appendix

1. Prevention

Smoking Prevalence

Definition: The percentage of the population aged 12 or older who reported smoking daily or occasionally in the previous year
Numerator: Number of daily or occasional smokers aged 12 years and older
Denominator: Total population aged 12 years and older
Data source: Statistics Canada, Canadian Community Health Survey (CCHS)
Measurement timeframe: 2014
CCHS variables: 1) In your lifetime, have you smoked a total of 100 or more cigarettes (about 4 packs)? 2) Have you ever smoked a whole cigarette? 3) At the present time, do you smoke cigarettes daily, occasionally or not at all? 4) Have you ever smoked cigarettes daily?
Stratification variables: Province/territory, sex
Provinces/territories with data available: All provinces/territories
Notes:

1) For comparison purposes, the same analysis was conducted looking at the population who were former smokers or never smoked.
2) CCHS data are based on a representative sample which is then extrapolated to the overall population.

Special Feature: Smoking Behaviours in Current Cancer Patients

Definition: Percentage of current cancer patients aged 12 years and older reporting daily or occasional smoking compared to the non-cancer patient population if the age distribution in the populations of interest were the same as that of the standard
Numerator: 1) Number of daily or occasional smokers who are current cancer patients; 2) Number of daily or occasional smokers who are in the non-cancer patient population
Denominator: 1) Total number of current cancer patients aged 12 years and older; 2) Total number of individuals in the non-cancer patient population aged 12 years and older
Data source: Statistics Canada, Canadian Community Health Survey (CCHS)
Measurement timeframe: 2011-2014 combined
CCHS variables: 1) In your lifetime, have you smoked a total of 100 or more cigarettes (about 4 packs)? 2) Have you ever smoked a whole cigarette? 3) At the present time, do you smoke cigarettes daily, occasionally or not at all? 4) Have you ever smoked cigarettes daily? 5) Do you have cancer?
Stratification variables: Cancer status (current cancer patients, non-cancer patient population), sex
Provinces/territories with data available: All provinces/territories
Notes:

1) Smoking prevalence by cancer status was age standardized to the 2011 Canadian population to account for the age distribution differences between the current cancer patient population and the non-cancer patient population.
2) Current cancer patients are defined as those who answered yes to the 'Do you have cancer?' question. Those who answered no are defined as the non-cancer patient population.
3) CCHS data are based on a representative sample which is then extrapolated to the overall population.

Human Papillomavirus (HPV) Vaccination

Definition: The percentage of girls in the age group (or school grades) targeted for immunization who have completed the HPV vaccine series based on the provincially/territorially recommended vaccination schedule
Numerator: Number of girls who have received the final dose (second or third dose, depending on the province/territory) of the HPV vaccination through the provincially/territorially organized program
Denominator: Number of girls in the target grade/age group in schools for the provincial/territorial school-based HPV vaccination program.
Data Source: Cervical Cancer Screening Guidelines Across Canada: Environmental Scan, July 2015; Canadian Partnership Against Cancer HPV Immunization Survey, July 2015; BC Centre for Disease Control; PEI Chief Public Health Office
Measurement timeframe: 2012/2013 school year for ON and SK; 2013/2014 school year for BC, AB, NS, PE, NL, NT; 2014/2015 school year for MB, QC, NB
Stratification variables: Province/territory
Provinces/territories with data available: BC, AB, SK, MB, ON, QC, NB, NS, PE, NL, NT
Province specific notes: SK, ON: HPV vaccination is offered in grade 6 and grade 8, respectively, but immunization information is not recorded by grade. Vaccination uptake is therefore assessed at age 13. **ON:** Complete-for-age logic was used to estimate coverage, which may result in overestimation, as it includes individuals who may not have completed the series, but who are not yet overdue for their subsequent dose. **NT:** Vaccination occurs in grades 4–6. The vaccination uptake listed is for grade 7 girls.
Notes:

1) The target grade and age group varies by province/territory.
2) Full course of vaccination is two doses in BC and QC and three doses in all other provinces/territories.
3) The denominator does not necessarily represent the entire female population within the target age range for the province.

Smoking Cessation

*available online only at www.systemperformance.ca

Definition: The percentage of recent daily or occasional smokers aged 20 or older who reported quitting smoking in the past two years and no longer smoke
Numerator: Former smokers aged 20 years and older who were no longer smoking at the time of the survey who have quit in the last 2 years (i.e. recent quitters)
Denominator: Recent quitters plus current smokers (i.e. those who are currently daily or occasional smokers) aged 20 years and older
Data source: Statistics Canada, Canadian Community Health Survey (CCHS)
Measurement timeframe: 2014
CCHS variables: 1) Current smoking status; 2) Number of years stopped smoking daily; 3) Number of years stopped smoking completely
Stratification variables: Province/territory, age group (20-34, 35-44, 45-64, 65+), sex
Provinces/territories with data available: All provinces/territories
Notes:

1) Current smokers and respondents who have never smoked a whole cigarette and respondents who did not smoke a total of 100 cigarettes or more lifetime were excluded from the population.
2) CCHS data are based on a representative sample which is then extrapolated to the overall population.

Second-hand Smoke Exposure

*available online only at www.systemperformance.ca

Definition: The percentage of non-smokers aged 12 or older who reported being exposed to smoke at home, in a vehicle or in a public place every day or almost every day over the previous year
Numerator: Number of non-smokers aged 12 years and older who reported someone smoking near them every day or almost every day
Denominator: Non-smokers aged 12 years and older
Data source: Statistics Canada, Canadian Community Health Survey (CCHS)
Measurement timeframe: By province - 2014. For overall trends, Canada - 2003 to 2014 (no data for 2004 and 2006)
CCHS variables: 1) Including both household members and regular visitors, does anyone smoke inside your home, every day or almost every day?; 2) In the past month, were you exposed to second-hand smoke every day or almost every day, in a car or other private vehicle?; 3) In the past month, were you exposed to second-hand smoke, every day or almost every day, in public places?
Stratification variables: Province/territory, age group (12-15, 16-19, 20-34, 35-44, 45-64, 65+), setting (home, vehicle, public)
Provinces/territories with data available: All provinces/territories
Notes:

1) Trend data were extracted from Statistics Canada's CANSIM Table 105-0501 (Health indicator profile). Before 2009, all rates in this table are calculated including non-response categories ("refusal", "don't know", and "not stated") in the denominator.
2) CCHS data are based on a representative sample which is then extrapolated to the overall population.

Alcohol Consumption – no alcohol intake

*available online only at www.systemperformance.ca

Definition: Percentage of adults aged 18 years and older that reported drinking no alcohol in the past 12 months
Numerator: Number of adults aged 18 years and older who reported drinking no alcohol in the past 12 months
Denominator: Total population aged 18 years and older
Data source: Statistics Canada, Canadian Community Health Survey (CCHS)
Measurement timeframe: 2014
CCHS variables: During the past 12 months, have you had a drink of beer, wine, liquor or any other alcoholic beverage?
Stratification variables: Province/territory
Provinces/territories with data available: All provinces/territories
Notes:

1) The word 'drink' means: 1 bottle or can of beer or a glass of draft, 1 glass of wine or a wine cooler, or 1 drink or cocktail with 1 1/2 ounces of liquor.
2) CCHS data are based on a representative sample which is then extrapolated to the overall population.

Alcohol Consumption – exceeding low-risk drinking guidelines

*available online only at www.systemperformance.ca

Definition: The percentage of adults aged 18 or older who reported exceeding the World Cancer Research Fund's (WCRF) recommended drinking guidelines (two drinks per day for men, one drink per day for women) in the past 12 months

Numerator: Number of individuals aged 18 years and older who reported exceeding the WCRF's recommended drinking guidelines

Denominator: Total population aged 18 years and older

Data source: Statistics Canada, Canadian Community Health Survey (CCHS)

Measurement timeframe: 2014

CCHS variables: 1) During the past 12 months, have you had a drink of beer, wine, liquor or any other alcoholic beverage?; 2) Thinking back over the past week, did you have a drink of beer, wine, liquor or any other alcoholic beverage?; 3) How many drinks did you have on each day during the past week?

Stratification variables: Province/territory

Provinces/territories with data available: QC, BC, SK, ON, NL, MB, PE, NU

Notes:

1) The word 'drink' means: 1 bottle or can of beer or a glass of draft, 1 glass of wine or a wine cooler, or 1 drink or cocktail with 1 1/2 ounces of liquor.
2) CCHS data are based on a representative sample which is then extrapolated to the overall population.

Adult Overweight and Obesity

*available online only at www.systemperformance.ca

Definition: The percentage of adults aged 18 or older reporting height and weight that result in a body mass index (BMI) of 25 kg/m^2 or greater (overweight threshold) and 30 kg/m^2 or greater (obesity threshold)

Numerator: Number of adults aged 18 years and older in each BMI classification category (i.e., overweight or obese)

Denominator: Total number of adults aged 18 years and older with valid height and weight responses

Data source: Statistics Canada, Canadian Community Health Survey (CCHS)

Measurement timeframe: By province – 2014. For overall trends, Canada - 2003 to 2014 (no data for 2004 and 2006)

CCHS variables: 1) Self-reported weight (kg); 2) Self-reported height (m);

Stratification variables: Province/territory, sex

Provinces/territories with data available: All provinces/territories

Notes:

1) Excludes pregnant women and people less than 3 feet tall or greater than 6 feet 11 inches.
2) Trend data were extracted from CANSIM Table 105-0501 (Health indicator profile). Before 2009, all rates in this table are calculated including non-response categories ("refusal", "don't know", and "not stated") in the denominator.
3) BMI was calculated as BMI = weight/$(height)^2$.
4) CCHS data are based on a representative sample which is then extrapolated to the overall population.

Fruit and Vegetable Consumption

*available online only at www.systemperformance.ca

Definition: The percentage of the population aged 12 or older who reported consuming fruit and vegetables at least five times per day
Numerator: Number of individuals aged 12 years and older reporting consuming fruits and vegetables 5 times or more daily
Denominator: Total population aged 12 years and older
Data source: Statistics Canada, Canadian Community Health Survey (CCHS)
Measurement timeframe: 2014
CCHS variables: Derived from FVCGTOT (daily consumption—total fruits and vegetables); included daily consumption of fruit juice, fruit (excluding fruit juice), green salad, potatoes (excluding French fries, fried potatoes or potato chips), carrots and other vegetables (excluding carrots, potatoes or salad)
Stratification variables: Province/territory
Notes:

1) This indicator serves as a proxy measure of the percentage of the population consuming the recommended servings of fruit and vegetables daily, as the CCHS measures only the number of times fruit and vegetables are consumed daily (frequency), not the amount consumed (servings).
2) CCHS data are based on a representative sample which is then extrapolated to the overall population.

2. Screening

Cervical Cancer Screening

Definition: The percentage of women aged 25–69 who reported being up to date on cervical cancer screening, defined as having had at least one Pap test in the previous three years
Numerator: Number of women aged 25-69 reporting having had at least one Pap test in the previous 3 years
Denominator: Total number of women aged 25-69
Data source: Statistics Canada, Canadian Community Health Survey (CCHS)
Measurement timeframe: 2012
CCHS variables: 1) Have you ever had a PAP smear test? 2) When was the last time? 3) Have you had a hysterectomy?
Stratification variables: Province/territory
Provinces/territories with data available: All provinces/territories
Notes:

1) Women who had a hysterectomy are excluded.
2) Estimates are age-standardized to the 2011 Canadian population.
3) CCHS data are based on a representative sample which is then extrapolated to the overall population.

Breast Cancer Screening

Definition: The percentage of women aged 50–69 who reported being up to date on breast cancer screening, defined as having had a mammogram for any reason in the previous two years
Numerator: Number of women aged 50-69 who had a mammogram in the previous 2 years for any reason
Denominator: Total number of women aged 50-69
Data source: Statistics Canada, Canadian Community Health Survey (CCHS)
Measurement timeframe: 2012
CCHS variables: 1) Have you ever had a mammogram that is, a breast x-ray? 2) When was the last time?
Stratification variables: Province/territory
Provinces/territories with data available: All provinces/territories
Notes:

1) Up to date is defined as having had a mammogram in the previous two years for any reason (family history of breast cancer, regular check-up/routine screening, age, previously detected lump, follow-up of breast cancer treatment, current use of hormone replacement therapy, breast problem or other).
2) CCHS data are based on a representative sample which is then extrapolated to the overall population.

Colorectal Cancer Screening

Definition: The percentage of the population aged 50–74 who reported being up to date on colorectal cancer screening/testing, defined as having done a fecal test in the previous two years and/or having undergone a colonoscopy or sigmoidoscopy in the previous five years for any reason
Numerator: Number of individuals aged 50-74 reporting having had a fecal occult blood test (FOBT) in the previous two years and/or a colonoscopy/sigmoidoscopy in the previous five years for any reason

Denominator: Total number of individuals aged 50-74
Data source: Statistics Canada, Canadian Community Health Survey (CCHS)
CCHS variables: 1) a. Have you ever had an FOBT test? b. When was the last time? 2) a. Have you ever had a colonoscopy or sigmoidoscopy? b. When was the last time?
Measurement timeframe: By province – 2012; For overall trends - 2008, 2012, 2013, 2014 (only provinces/territories with data for all four years were included (AB, MB, QC, NB, PE, NL and NT)
Stratification variables: Province/territory
Provinces/territories with data available: By province: All provinces/territories. For overall trends - AB, MB, QC, NB, PE, NL and NT
Notes:

1) Up to date is defined as having had a fecal test in the previous two years and/or a colonoscopy or sigmoidoscopy in the previous five years for any reason (family history of colorectal cancer, regular check-up/routine screening, age, race, follow-up of problem, follow-up of colorectal cancer treatment or other).
2) Fecal occult blood test can be either a guaiac test (gFOBT) or an immunochemical test (FIT).
3) CCHS data are based on a representative sample which is then extrapolated to the overall population.

3. Diagnosis

Breast Cancer Diagnosis Wait Times

Definition: The median and 90th percentile wait time (weeks) between an abnormal breast screen result and resolution, with or without biopsy, for asymptomatic women aged 50–69 screened by provincial breast screening programs
Population: Women aged 50-69 participating in an organized breast screening program and who had an abnormal breast screen result (mammogram or clinical breast examination). Two patient groups were analyzed: 1) patients requiring a tissue biopsy and 2) patients not requiring a tissue biopsy to resolve the diagnosis
Data source: Provincial breast cancer screening programs
Measurement timeframe: 2013 screening year
Stratification variables: Province
Provinces submitting data: BC, AB, SK, MB, ON, NB, NS, PE, NL
Province-specific notes:
ON: Women with final result unknown/lost to follow-up were excluded.
Notes:
1) Patients who did not receive resolution within 6 months of an abnormal breast screen were excluded.
2) Tissue biopsy does not include fine needle aspiration (FNA).
3) Tissue biopsy includes core (needle) biopsy with or without image guidance and open (*excisional*) biopsy with or without image guidance.

Colorectal Cancer Diagnosis Wait Times

Definition: The median and 90th percentile wait time (days) between an abnormal fecal test result and a follow-up colonoscopy required to resolve the diagnosis among people screened by provincial colorectal cancer screening programs
Population: Individuals with an abnormal fecal test (from colorectal cancer screening) who went on to receive a colonoscopy within 180 days of the fecal test result
Data source: National Colorectal Cancer Screening Network
Measurement timeframe: 2013 - 2014 screening year
Stratification variables: Province
Provinces submitting data: BC, AB, SK, MB, NS, PE, NL
Province-specific notes:
BC: Started colorectal screening program on November 15, 2013. The data were based on the period from November 15, 2013 to December 31, 2014.
AB: Multiple databases had been used to capture the follow-up colonoscopies, such as the National Ambulatory Care Reporting System (NACRS), the Discharge Abstract Database (DAD) and claims. The uptake rates were underestimated due to incomplete colonoscopy data, which was caused by delays between the time of colonoscopy and the time the colonoscopy was reported to the databases. In general, reporting delays for NACRS and DAD are at least 1.5 months; some clinics might have longer delay periods. The available physician claims data in the data warehouse covers until March 31, 2014.
PE: Some of the individuals with long waits for colonoscopy had used the FOBT kit after a recent colonoscopy. This is not in line with guidelines and results in skewed wait time results.
Notes:

1) Date of abnormal fecal test is the date the result is reported by the laboratory for each individual test; if there is more than one abnormal fecal test, the date of the first test is used.
2) The colonoscopy may have been performed inside or outside of the screening program but only for individuals who had their fecal test performed in the screening program.

Capture of Stage

*available online only at www.systemperformance.ca

Definition: The percentage of cancer incident cases for which valid data on stage at diagnosis are available and collected by the provincial cancer agencies
Numerator: Number of stageable* incident cases in the provincial cancer registry (stage 0 – IV including occult and "Unknown")
Denominator: Total number of stageable incident cases (stage 0 through to "Not Available")
Exclusions:

- Age (at diagnosis) 0 – 17
- Non-melanoma skin cancer (M8050-8110 with site code C44.0 to C44.9)
- Colorectal reporting for appendix C18.1
- Lymphoma codes M-95 to M-98, all sarcoma codes

Data source: Provincial cancer agencies
Measurement timeframe: 2012 and 2013 diagnosis years
Stratification variable: Province, disease site (1. All cancers; 2. Four most common cancers - breast, prostate, colorectal, and lung (NSCLC, SCLC))
Provinces submitting data: BC, AB, SK, MB, ON, NB, NS, PE, NL
Province-specific notes:
AB: Hematology, sarcoma and melanoma morphologies were removed from the site-specific cancers. All 2012-2013 invasive primaries are collaboratively staged and once coded there should be no cases with missing/not available stage values. Currently 'Not Available' indicates the number of cases that have a missing stage at the time of data pull as the registry status was not complete and staging information is still to come. Certain skin cancers (C44 codes) with morphologies other than basal-squamous are not staged according to Alberta Cancer Registry (ACR) rules. For this indicator, codes 8002, 8073 and 8803 are included as NSCLC.
SK: "All cancers" do not include non-melanoma skin cancers diagnosed in the province (topography codes C44.0 to C44.9 and histology codes not in 8720-8790). The denominator includes incident cases for which stage is recorded as 'Not Applicable' since SK does not differentiate between 'Not Applicable' and 'Not Available' categories.
ON: Data submitted exclude stage 0 cases.
NB: From 2008 onwards, only the four most common cancers (breast, colorectal, lung and prostate cancers) are staged.
NL: Staging is not complete for 2014 so it is not possible to report on 'All cancers (2013).
Notes:
1) The group stages for cancer incident cases were classified by AJCC Cancer Staging 7th edition.
2) By AJCC, cancer incident cases are categorized in terms of stage as:
    a. Stageable: including stage 0, stage I through stage IV, stage unknown
    b. Not Applicable: Not stageable through AJCC
    c. Not Available: Cases for which stage data is not available or invalid
    d. Unknown: Cases for which there is insufficient information to ascertain a definitive stage

3) Stage 0 includes in-situ and invasive cancer cases. Stage occult for lung cancer cases are included as well.
4) Breast cancer cases only include females.

Stage Distribution

*available online only at www.systemperformance.ca

Definition: The percentage breakdown of incident cases by stage at diagnosis for breast, lung, colorectal and prostate cancer

Numerator: Number of stageable* incident cases in the provincial cancer registry for each stage at diagnosis (stage 0 – IV including occult, "Unknown")

Denominator: Total number of stageable incident cases (stage 0 through to "Not Available")

Exclusions:

- Age (at diagnosis) 0 – 17
- Non-melanoma skin cancer (M8050-8110 with site code C44.0 to C44.9)
- Colorectal reporting for appendix C18.1
- Lymphoma codes M-95 to M-98, all sarcoma codes

Data source: Provincial cancer agencies

Measurement timeframe: 2013 diagnosis year

Stratification variable: Stage at diagnosis, disease site (breast, prostate, colorectal, lung (NSCLC, SCLC), ovarian)

Provinces submitting data: BC, AB, SK, MB, NB, NS, PE, NL

Province-specific notes:

AB: Hematology, sarcoma and melanoma morphologies were removed from the site-specific cancers. All 2012-2013 invasive primaries are collaboratively staged and once coded there should be no cases with missing/not available stage values. Currently 'Not Available' indicates the number of cases that have a missing stage at the time of data pull as the registry status was not complete and staging information is still to come. Certain skin c44 with morphologies other than basal-squamous are also not staged according to Alberta Cancer Registry (ACR) rules. For this indicator, codes 8002, 8073 and 8803 are included as NSCLC.

SK: The denominator includes incident cases for which stage is recorded as 'Not Applicable' since SK does not differentiate between 'Not Applicable' and 'Not Available' categories.

ON: Data submitted exclude stage 0 cases and thus are not presented in the stage distribution figure. 'Breast' only includes female breast cancer cases.

NB: From 2008 onwards, only the four most common cancers (breast, colorectal, lung and prostate cancers) are staged.

Notes:

1) The group stages for cancer incident cases were classified by AJCC Cancer Staging 7th edition.
2) By AJCC, cancer incident cases are categorized in terms of stage as:
    a. Stageable: including stage 0, stage I through stage IV, stage unknown
    b. Not Applicable: Not stageable through AJCC
    c. Not Available: Cases for which stage data is not available or invalid
    d. Unknown: Cases for which there is insufficient information to ascertain a definitive stage
3) Stage 0 includes in-situ and invasive cancer cases. Stage occult for lung cancer cases are included as well.
4) Breast cancer cases only include females.

4. Treatment

4.1 Surgery

Removal and Examination of 12 or More Lymph Nodes in Colon Resections

Definition: The percentage of colon resections with 12 or more lymph nodes removed and examined
Numerator: Invasive colon cancer cases that were resected with 12 or more lymph nodes removed and examined within one year of diagnosis
Denominator: All invasive colon cancer cases resected within 12 months of diagnosis
Data source: Provincial cancer agencies
Measurement timeframe: 2009, 2010, 2011 and 2012 diagnosis years
Stratification variables: Province, age group, sex
Provinces submitting data: AB, SK, MB, ON, NB, NS, PE, NL
Province specific notes: AB: For 2009/2010/2011/2012/, treatment information is based on initially planned treatment to primary site (Alberta Cancer Registry (ACR) data). The Canadian Classification of Health Interventions (CCI) codes are not used by the ACR; as such, all coded surgeries were included for complete colon resection. If more than one surgical procedure is performed as a part of the initial treatment, the most definitive procedure is documented. The definition of definitive is the surgical procedure with the intent to cure. Through quality assurance, there were a number of the cases coded as surgery on the ACR but that had CCI codes or billing codes other than the ones listed. The majority of these cases appear to be cases in which the DAD had resection of the rectum even though the patient only had C18.7 sigmoid colon. For 2010/2011/2012, cases for C18.1 Appendix were excluded. However, there were also some cases in which the ACR codes surgery for polypectomy and hence these had also been included in 2011. There are also some cases in which the ACR codes surgery for colon but no records were found in the Inpatient database or billing data. This may be out of province resection in 2012. Data did not limit to complete resection (colectomy) in 2009. **ON:** Data were generated by the CSQI methodology. 2010 data were for colon cancer cases with 12 or more lymph nodes examined in 2010 rather than colon cancer cases that were diagnosed in 2010. Cases for Appendix C18.1 were excluded in 2011. **NS:** For 2011, collaborative stage variables were used to identify those having a resection. Resections dates manually reviewed from chart review. **PE:** For 2009, the CS Extension Evaluation code (=3) was used to meet AJCC pathological criteria for staging. For 2011, cases for Appendix C18.1 were excluded. **NL:** For 2009/2010, data did not limit to complete sections (colectomy).
Notes:

1) Colon cases were defined as ICDO3 codes: C18.0 to 18.9 with behavior code 3 (malignant).
2) Excluded cases with lymphoma Codes M-95 to M-98, sarcoma codes (see Appendix 1), neuroendocrine carcinoma, squamous cell carcinoma were excluded.
3) Cases for patients under 18 years of age (at diagnosis) were excluded.
4) Colon resections identified using CCI codes: 1NM87 or 1NM89 or 1NM91 or list of descriptors in Appendix 1.
5) All resected cases were included, regardless of margin status.

6) Cases with unknown number of nodes removed and examined were excluded from both numerator and denominator.
7) Included cases where the last resection date (if multiple) – diagnosis date <=365 days.

Resection Rate for Patients with Stage II or III Rectal Cancer

*available online only at www.systemperformance.ca

Definition: The percentage of patients diagnosed with stage II or III rectal cancer who had a surgical resection

Numerator: The number of cases receiving a rectal resection within 1 year of diagnosis

Denominator: The number of stage II and III rectal cancer cases

Data source: Provincial cancer agencies

Measurement timeframe: 2009, 2010, 2011 and 2012 diagnosis years

Stratification variables: Province, sex, age

Provinces submitting data: AB, SK, MB, ON, NB, NS, PE, NL

Province specific notes: AB: For 2009, resections were not necessarily limited to the specified types (complete rectum). For 2010/2011/2012, treatment information is based on initially planned treatment to primary site (ACR data). The CCI codes are not identified in the ACR, as such all coded surgeries were included for complete rectum resection. If more than one surgical procedure is performed, the ACR codes the most definitive procedures is documented. The definition of definitive is the surgical procedure with the intent to cure. There are some procedures could not identify the margins are negative. **MB**: For 2010/2011/2012, data were not limited to complete resections where margins are negative. **NB:** For 2010, the surgery information was captured in Cancer Registry instead of Discharge Abstract Database. **NS:** For 2009, cases from Cumberland Health Authority were included. For 2010, collaborative stage variables were used to identify those having resections. Individual charts were reviewed to obtain resection date. Extension codes were used to identify true resections (i.e. polypectomies were not considered resections. For 2010/2011/2012, data were not limited to complete resections where margin is negative. **PE:** For 2010/2011, data were not limited to complete resection where margins are negative. **NL:** For 2010, margin status was not recorded. Ineligible surgeries were excluded. For 2011/2012, data were limited to complete resections where margin is negative.

Notes:

1) Rectal cases defined as ICDO3 codes: C19.9 or C20.9, AJCC group stage at diagnosis = II or III.
2) Excluded lymphoma codes M-95 to M-98. For 2010/2011/2012, data also excluded sarcoma codes (see Appendix 1), neuroendocrine carcinoma, squamous cell carcinoma.
3) Cases for patients under 18 years of age were excluded.
4) Rectal resection identified using CCI codes 1NQ87 or 1NQ89 or see list of descriptors in Appendix 1. For 2009/2010, CCI codes also included INQ59.
5) Resected cases included regardless of margin status.
6) Included cases which last resection data (if multiple)-diagnosis date<=365 days for 2009. For year 2010, 2011 and 2012, the inclusion definition has been updated to include 1st resection date (if multiple)-diagnosis date<=365.

Resection Rate for Patients with Stage III Colon Cancer

*available online only at www.systemperformance.ca

Definition: The percentage of patients diagnosed with stage III colon cancer who had a surgical resection

Numerator: The number of cases receiving a colon resection within 1 year of diagnosis

Denominator: The number of stage III colon cancer cases
Data source: Provincial cancer agencies
Measurement timeframe: 2009, 2010, 2011 and 2012 diagnosis year
Stratification variables: Province, sex, age
Provinces submitting data: AB, SK, MB, NB, PE, NL
Province specific notes: AB: For 2009, data did not limited to complete resections (colectomy). For 2010/2011/2012, treatment information is based on initially planned treatment to primary site (ACR data). The CCI codes are not identified in the ACR, as such all coded surgeries were included for complete colon resection. If more than one surgical procedure is performed, the ACR codes the most definitive procedures is documented. The definition of definitive is the surgical procedure with the intent to cure. There are some procedures could not identify the margins are negative. For 2011/2012, through quality assurance, there are a number of cases coded as surgery on the ACR had CCI codes or Billing codes other than the ones listed. The majority of these cases appear to be cases in which the DAD had resection of the rectum even though the patient only had C18.7 sigmoid colon. There are also some cases in which the ACR codes surgery for colon but no records were found in the Inpatient database or Billing data. This may be out of province resection. **SK:** For 2012, data were not limited to complete resections where margins are negative. **MB**: For 2010/2011/2012, data were not limited to complete resections where margins are negative. **NB:** For 2010, the surgery information was captured in Cancer Registry instead of Discharge Abstract Database. For 2012**,** all surgeries were included where margins are positive or negative. **PE:** For 2010/2011, data were not limited to complete resection where margins are negative. **NL:** For 2010, margin status was not recorded. Ineligible surgeries were excluded. For 2011/2012, data were limited to complete resections where margin is negative.
Notes:

1) Colon cases defined as ICDO3 codes: C18.0-C18.9 for 2009, C18.0 and C18.2 to C18.9 for 2010/ 2011/ 2012, AJCC group stage at diagnosis = III.
2) Excluded lymphoma codes M-95 to M-98. For 2010/2011/2012, data also excluded sarcoma codes (see Appendix 1), neuroendocrine carcinoma, squamous cell carcinoma.
3) Cases for patients under 18 years of age were excluded.
4) Colon resection identified using CCI codes 1NM87 or 1NM89 or 1NM91 or list of descriptors in Appendix 1.
5) Resected cases included regardless of margin status.
6) Included cases which last resection data (if multiple)-diagnosis date<=365 days for 2009. For year 2010, 2011 and 2012, the inclusion definition has been updated to include 1st resection date (if multiple)-diagnosis date<=365.

Resection Rate for Patients with Stage II or IIIA Non-Small Cell Lung Cancer

*available online only at www.systemperformance.ca

Definition: The percentage of patients diagnosed with stage II or IIIA non-small cell lung cancer who had a surgical resection
Numerator: The number of cases receiving a surgical resection within 1 year of diagnosis
Denominator: The number of stage II or IIIA non-small cell lung cancer cases
Data source: Provincial cancer agencies
Measurement timeframe: 2009, 2010, 2011 and 2012 diagnosis year
Stratification variables Province, sex, age
Provinces submitting data: AB, SK, MB, ON, NB, NS, PE
Province specific notes: AB: For 2009, resections not necessarily limited to the specified types (lobectomy, pneumonectomy or segmentectomy). For 2010/2011/2012, treatment information is based

on initially planned treatment to the primary site (ACR data). The CCI codes are not identified in the ACR, as such all coded surgeries were included for complete lung resection. If more than one surgical procedure is performed, the most definitive procedure is documented. The definition of definitive is the surgical procedure with the intent to care. This indicator excludes case with stage="III". **SK, MB:** For 2012, all surgeries are included where margins are unable to identify as negative. **NS:** For 2010/2011, collaborative stage variables were used to identify those having resections. Individual chart were reviewed to obtain resection date.

Notes:

1) Non-small cell lung cases defined as ICDO3 codes: C34.0 to C34.9, AJCC group stage at diagnosis = II or IIIA.
2) Excluded lymphoma codes M-95 to M-98. For 2010/2011/2012, data also excluded sarcoma codes (see Appendix 1), neuroendocrine carcinoma. For 2010/2011, squamous cell carcinomas was also excluded, but included in 2012.
3) Excluded histology codes: 8002, 8041, 8043, 8044, 8045, 8073 and 8803 in 2010/2011/2012 data.
4) Cases for patients under 18 years of age were excluded.
5) Lung resections defined as CCI codes 1GR87, 1GR89, 1GR91, 1GT59, 1GT87, 1GT89 or 1GT91 or list of descriptors in Appendix 1.
6) Resected cases included regardless of margin status (due to data limitations).
7) Included cases which last resection data (if multiple)-diagnosis date<=365 days.

The Use of Breast-Conserving Surgery versus Mastectomies for Breast Cancer Resections

Definition: The percentage of women receiving a breast cancer resection for whom breast-conserving surgery (BCS) was their final procedure (i.e., where BCS was their first surgery or where a wider excision in the context of BCS was performed within one year of their first surgery)

Numerator: Women aged 18 and older who received breast conserving surgery (BCS) as their final procedure within one year

Denominator: Women with unilateral invasive breast cancer who received breast conserving surgery and/or a mastectomy

Data source: Hospital Morbidity Database, Canadian Institute for Health Information (CIHI); National Ambulatory Care Reporting System, CIHI; Alberta Ambulatory Care Reporting System, Alberta Health and Wellness

Measurement timeframe: By province - 2009/10 to 2013/14 fiscal years combined. For trends - 2008/09–2010/11 and 2011/12–2013/14 fiscal years combined

Stratification variables: Province/territory

Provinces submitting data: BC, AB, SK, MB, ON, QC, NB, NS, PE, NL and Territories

Notes:

1) The following surgical and diagnostic codes, as documented in hospital patient records and reported to CIHI, were used to identify diagnoses and procedures per the following:
    a. In order to identify a breast cancer diagnosis, the following ICD-10-CA codes were used: C50.00, C50.01, C50.09, C50.10, C50.11, C50.19, C50.20, C50.21, C50.29, C50.30, C50.31, C50.39, C50.40, C50.41, C50.49, C50.50, C50.51, C50.59, C50.60, C50.61, C50.69, C50.80, C50.81, C50.89, C50.90, C50.91, C50.99. Women with unilateral invasive breast cancer were the focus of this analysis (comprising 98% of women with invasive breast cancer).

b. In order to identify a mastectomy, the following surgical codes were used according to CCI: 1.YM.89 to 1.YM.92.
c. The following CCI codes were used to identify a breast conserving surgery: 1.YM.87, 1.YM.88.

2) Territories include YT, NT and NU.
3) The data include women with unilateral invasive breast cancer.
4) For comparison purposes, the same analysis was conducted looking at the use of mastectomies.

4.2 Radiation Therapy

Radiation Therapy Wait Times

Definition: 1) The median and 90th percentile radiation therapy wait time (days) from ready-to-treat to start of radiation for patients treated for all types of cancer and for the four most common cancers. 2) The percentage of radiation therapy cases for which the above wait time was within target timeframes
Population: All cancer patients receiving radiation therapy in 2014 who have wait time data collected as consistent with the specifications of this indicator.
Data source: Provincial cancer agencies
Measurement timeframe: 2014 treatment year
Stratification variables: Province, disease site (all cancers, breast, colorectal, lung, prostate)
Provinces submitting data: BC, AB, MB, ON, QC, NB, NS, PE, NL
Province specific notes: BC: Brachytherapy was not included. **AB:** data include all cases who had radiation therapy at a Cancer Control Alberta Facility with their first treatment between January 2, 2014 - December 31, 2014; it includes those who were living in another province at time of diagnosis but receiving radiation therapy in Alberta. Tumor group classification for this indicator is based on referral tumor groups. Brachytherapy was not included. **ON**: Only provided the percentage of radiation therapy cases for which the wait time was within target < 14 days from February to December 2014. **QC:** Only provided the percentage of radiation therapy cases for which the wait time was within target timeframes. **NS**: Patients with more than one treated disease may have contributed to more than one wait time. Procedures around specifying ready-to-treat date have not accurately captured the relevant date for prostate and breast patients, so the wait times for these two cancers are not reported. **PE:** Could not provide site-specific wait times.
Provincial definitions of 'Ready to Treat':
AB: The date when the patient is physically ready to commence treatment. **BC:** The date at which both oncologist and patient agree that treatment can commence. Being ready to treat requires that all diagnostic tests and procedures required to assess the appropriateness of, indications for, and fitness to undergo radiation therapy are complete. **MB:** The date when a decision has been made by the radiation oncologist and is agreed to by the patient that radiation therapy is appropriate and should commence AND the patient is medically ready to start treatment AND the patient is willing to start treatment. **NB:** The date when any planned delay is over and the patient is ready to begin treatment from both a social/personal and medical perspective. **NL:** The date when all pre-treatment investigations and any planned delay are over, and the patient is ready to begin the treatment process from both a social/ personal and medical perspective. **NS:** The date when all pre-treatment investigations and any planned delay are over, and the patient is ready to begin the treatment process from both asocial/personal and medical perspective. Nova Scotia did not have a ready to treat date until February 2010; a proxy date was used prior to this time. **ON:** The time from when the specialist is confident that the patient is ready to begin treatment to the time the patient receives treatment. **PE:**

The date when all pre-treatment investigations and any planned delay are over, and the patient is ready to begin the treatment process from both a social/personal and medical perspective. **QC:** At consultation, the radiation oncologist enters the date at which the patient will be ready to treat on a formulary requesting treatment. **SK:** The date when the patient is ready to receive treatment, taking into account clinical factors and patient preference. In the case of radiation therapy, any preparatory activities (e.g., simulation, treatment planning, dental work) do not delay the ready to treat date.
Notes:

1) All behavior codes are included.
2) To identify breast, colorectal, lung, prostate cancer and all cancers, provinces included the morphology codes that are used within their registry.
3) Only cases with external beam radiation therapy (EBRT) done in 2014 are included.
4) Of note for breast cancer data, if the province obtains this data from a wait time database as opposed to a registry, then breast cancer cases were to be included per the database definition.
5) There are known discrepancies in the ways in which different provinces measure wait times. One of the key sources of variation is the way the "ready-to-treat" timeframe is defined. Efforts are underway to standardize these definitions. The following section outlines the definitions used by the different provinces.

Pre-Operative Radiation Therapy for Patients with Stage II or III Rectal Cancer

Definition: The percentage of patients diagnosed with stage II or III rectal cancer who received pre-operative radiation therapy
Numerator: Stage II and III rectal cancer cases receiving pre-operative radiation therapy up to 120 days before resection
Denominator: Stage II and III rectal cancer cases who had a rectal resection within one year of diagnosis
Data source: Provincial cancer agencies
Measurement timeframe: 2009, 2010, 2011 and 2012 diagnosis year
Stratification variables: Province, age group, sex
Provinces submitting data: AB, MB, ON, NB, NS, PE, NL
Province specific notes: AB: For 2009, resections were not necessarily limited to the specified types (complete rectum). For 2010/2011/2012, treatment information is based on initially planned treatment to primary site (ACR data). The CCI codes are not identified in the ACR, as such all coded surgeries were included for complete rectum resection. If more than one surgical procedure is performed, the ACR codes the most definitive procedures is documented. The definition of definitive is the surgical procedure with the intent to cure. There are some procedures could not identify the margins are negative. For 2011/2012, through quality assurance, there are a number of cases coded as surgery on the ACR had CCI codes or Billing codes other than the ones listed. The majority of these cases appear to be cases in which the DAD had resection of the rectum even though the patient only had C18.7 sigmoid colon. There are also some cases in which the ACR codes surgery for colon but no records were found in the Inpatient database or Billing data. This may be out of province resection. Cases with radiation therapy after surgery were excluded. **SK:** For 2009, the adjuvant treatment and the site radiation therapy was applied to could not be identified. For 2012, data were not limited to complete resections where margins are negative. **MB**: For 2009, radiation therapy was not limited to primary tumor site. For 2010/2011/2012, data were not limited to complete resections where margins are negative. **ON**: For 2009, radiation therapy was not limited to primary tumor site**. NB:** For 2010, the surgery information was captured in Cancer Registry instead of Discharge Abstract Database. For 2012**,** all surgeries were

included where margins are positive or negative. **NS:** For 2009, cases from Cumberland Health Authority were included. For 2010, collaborative stage variables were used to identify those having resections. Individual charts were reviewed to obtain resection date. Extension codes were used to identify true resections (i.e. polypectomies were not considered resections). For 2010/2011/2012, data were not limited to complete resections where margin is negative. **PE:** For 2009/2010, treatment intent filter was used to identify neo-adjuvant therapy. For 2010/2011, data were not limited to complete resection where margins are negative. **NL:** For 2009/2010, treatment intent filter was used to identify neo-adjuvant therapy. For 2010, margin status was not recorded. Ineligible surgeries were excluded. For 2011/2012, data were limited to complete resections where margin is negative.

Notes:

1) The benefit of pre-operative radiation therapy for patients with tumours of the recto-sigmoid junction is not clear, therefore, the same analysis was conducted including and excluding tumours of the recto-sigmoid junction.
2) Rectal cases defined as ICDO3 codes: C19.9 or C20.9, AJCC group stage at diagnosis = II or III.
3) Excluded lymphoma codes M-95 to M-98. For 2010/2011/2012, data also excluded sarcoma codes (see Appendix 1), neuroendocrine carcinoma, squamous cell carcinoma.
4) Cases for patients under 18 years of age were excluded.
5) Rectal resection identified using CCI codes 1NQ87 or 1NQ89 or see list of descriptors in Appendix 1. For 2009/2010, CCI codes also included INQ59.
6) Resected cases included regardless of margin status.
7) Included cases where the last resection data (if multiple)-diagnosis date<=365 days for 2009. For year 2010, 2011 and 2012, the inclusion definition has been updated to include 1st resection date (if multiple)-diagnosis date<=365.

Post-Operative Radiation Therapy for Patients with Stage I or II Breast Cancer

*available online only at www.systemperformance.ca

Definition: The percentage of patients diagnosed with stage I or II breast cancer who received post-operative radiation therapy following breast-conserving surgery (BCS)

Numerator: Stage I and II breast cancer cases (female) starting radiation therapy within 270 days following breast-conserving surgery

Denominator: Stage I and II breast cancer cases (female) receiving breast-conserving surgery within one year of diagnosis

Data source: Provincial cancer agencies

Measurement timeframe: 2009, 2010, 2011 and 2012 diagnosis years

Stratification variables: Province, age group

Provinces submitting data: AB, SK, MB, ON, NB, NS, PE, NL

Province specific notes: AB: For 2009, segmental resections were included as lumpectomy. For 2010/2011/2012, treatment information is based on initially planned treatment to the primary site (ACR data). The CCI codes are not used by the ACR Data, as such Breast conserving surgery has been identified by a registry surgical modality variable with values 'lumpectomy' or 'segmental resection'. If more than one surgical procedure is performed as a part of the initial treatment, the most definitive procedure is documented. The definition of definitive is the surgical procedure with the intent to cure. Cases with radiation therapy before surgery were excluded. **SK:** Date of surgery was not available for cases diagnosed in 2009. **ON:** Radiation therapy was not limited to primary tumor site. **MB:** For 2011 and 2012, treatment intent filter was not applied. Radiation therapy was not limited to primary tumor site. **PE:** Treatment intent filter applied for 2009, but not applied for 2010 as it was only entered part way through the year so data is missing for half of the applicable cases. For 2010, radiation therapy is limited

to primary tumor site. For 2011 and 2012, malignant phylodes tumor is included. **NL:** For 2009/2010/ 2011/2012, treatment intent filter applied and radiation therapy is limited to primary tumor site.
Notes:

1) Breast cases identified as ICDO3 codes: C50.0 to C50.9, AJCC group stage at Diagnosis = I or II.
2) Exclude male and lymphoma codes M-95 to M-98. For 2010 /2011/2012, also excluded sarcoma codes (see Appendix 1), neuroendocrine carcinoma and squamous cell carcinoma.
3) Cases for patients under 18 years of age (at diagnosis) were excluded.
4) Breast-conserving surgery cases are identified using CCI codes: 1YM87 or 1YM88.
5) Cases with a subsequent mastectomy within one year of breast conserving surgery were excluded, using CCI codes 1YM89 to 1YM92 in the specified time period.
6) Resected cases included regardless of margin status (due to data limitations).
7) Included cases which last resection date (if multiple) - diagnosis date <= 365 days, radiation start date - last resection date (if multiple) <=270 days.

4.3 Systemic Therapy

Post-Operative Chemotherapy for Patients with Stage II or IIIA Non-Small Cell Lung Cancer

Definition: The percentage of patients diagnosed with stage II or IIIA non-small cell lung cancer (NSCLC) who received post-operative chemotherapy
Numerator: Stage II and IIIA non-small cell lung cancer cases that had a resection within one year of diagnosis and started adjuvant chemotherapy within 120 days of resection
Denominator: Stage II and IIIA non-small cell lung cancer cases having a lung resection within one year of diagnosis
Data source: Provincial cancer agencies
Measurement timeframe: 2009, 2010, 2011 and 2012 diagnosis years
Stratification variables: Province, age group, sex
Provinces submitting data: AB, SK, MB, ON, NS, PE
Province specific notes: AB: For 2009, resections not necessarily limited to the specified types (lobectomy, pneumonectomy or segmentectomy). For 2010/2011/2012, treatment information is based on initially planned treatment to the primary site (ACR data). The CCI codes are not identified in the ACR, as such all coded surgeries were included for complete lung resection. If more than one surgical procedure is performed, the most definitive procedure is documented. The definition of definitive is the surgical procedure with the intent to care. This indicator excludes case with stage="III". Chemotherapy before surgery were excluded. There are some other procedures in which the margins could not be identified as negative. **SK:** For 2011, data included squamous cell carcinoma cases. For 2012, all surgeries are included where margins could not be identified as negative, and oral and IV chemotherapy were not included. **MB:** For 2009, oral drugs given at Cancer Care Manitoba are included. However, patients who received oral chemotherapy through prescription may be missed in the reported data. For 2010, oral chemotherapy was included but might not be complete. For 2012, all surgeries are included where margins could not be identified as negative. **ON:** most oral chemotherapy were excluded since those data were not reliably reported to Cancer Care Ontario. 2009 data are for 2009/2010, 2010 data are for 2010/2011. 2011 data are for 2011/2012, 2012 data are for 2012/2013. **NS:** For 2010/2011, collaborative stage variables were used to identify those having resections. Individual chart were reviewed to obtain resection date. **PE:** For 2009, treatment intent filter was used to identify adjuvant

therapy. It didn't apply for 2010 data as it was only entered part way through the year so data is missing for half of the applicable cases. For 2011, data included squamous cell carcinoma cases.

Notes:

1) Non-small cell lung cases defined as ICDO3 codes: C34.0 to C34.9, AJCC group stage at diagnosis = II or IIIA.
2) Lung resections defined as CCI codes 1GR87, 1GR89, 1GR91, 1GT59, 1GT87, 1GT89 or 1GT91 or list of descriptors in Appendix 1.
3) Excluded lymphoma codes M-95 to M-98. For 2010/2011/2012, data also excluded sarcoma codes (see Appendix 1), neuroendocrine carcinoma. For 2010/2011, squamous cell carcinomas was also excluded, but included in 2012.
4) Excluded histology codes: 8002, 8041, 8043, 8044, 8045, 8073 and 8803 in 2010/2011/2012 data.
5) Resected cases included regardless of margin status (due to data limitations).
6) Included cases where last resection data (if multiple)-diagnosis date<=365 days, chemotherapy start date - last resection date (if multiple) <=120 days.
7) Chemotherapy includes oral (as available in data) and IV chemotherapy for 2010/2011/2012.
8) Cases for patients under 18 years of age were excluded.
9) No filter for treatment intent was used, unless specified by province for 2009.

Post-Operative Chemotherapy for Patients with Stage III Colon Cancer

*available online only at www.systemperformance.ca

Definition: The percentage of patients diagnosed with stage III colon cancer who received chemotherapy following resection

Numerator: Stage III colon cancer cases that had a resection within one year of diagnosis and started post-operative chemotherapy within 120 days of resection

Denominator: Stage III colon cancer cases having a colon resection within one year of diagnosis

Data source: Provincial cancer agencies

Measurement timeframe: 2009, 2010, 2011 and 2012 diagnosis years

Stratification variables: Province, age, sex

Provinces submitting data: AB, SK, MB, PE, NL

Province-specific notes: AB: For 2009, data were not limited to complete resections (colectomy). For 2010/2011/2012, treatment information is based on initially planned treatment to primary site (ACR data). The CCI codes are not identified in the ACR, as such all coded surgeries were included for complete rectum resection. If more than one surgical procedure is performed, the ACR codes the most definitive procedures is documented. The definition of definitive is the surgical procedure with the intent to cure. There are some procedures could not identify the margins are negative. For 2011/2012, through quality assurance, there are a number of cases coded as surgery on the ACR had CCI codes or Billing codes other than the ones listed. The majority of these cases appear to be cases in which the DAD had resection of the rectum even though the patient only had C18.7 sigmoid colon. There are also some cases in which the ACR codes surgery for colon but no records were found in the Inpatient database or Billing data. This may be out of province resection. Cases with chemotherapy before surgery were excluded**. SK:** For 2012, data were not limited to complete resections where margins are negative. **MB**: For 2009, oral drugs given at Cancer Care Manitoba are included. However, patients who received oral chemotherapy through prescription may be missed in the reported data. For 2010/2011/2012, data were not limited to complete resections where margins are negative, oral systemic therapy included if available but may not be complete. **PE:** Treatment intent filter was used to identify adjuvant therapy for 2009. But it was not applied for 2010 data as it was only entered part way through the year so data is missing for half of the applicable cases. For 2010/2011, data were not limited to complete resection

where margins are negative. **NL:** For 2009/2010, treatment intent filter was used to identify adjuvant therapy**.** For 2010, cases where margin status was positive or unknown were removed from the denominator. All cases that did not have an eligible surgery as per Procedure Codes table were removed from the denominator. In many cases, data were available for the date on which a chemotherapy script was written but not a definitive start date.

Notes:

1) Colon cases defined as ICDO3 codes: C18.0-C18.9 for 2009, C18.0 and C18.2 to C18.9 for 2010/ 2011/ 2012, AJCC group stage at diagnosis = III.
2) Excluded lymphoma codes M-95 to M-98. For 2010/2011/2012, data also excluded sarcoma codes (see Appendix 1), neuroendocrine carcinoma, squamous cell carcinoma.
3) Cases for patients under 18 years of age (at diagnosis) were excluded.
4) Colon resection identified using CCI codes 1NM87 or 1NM89 or 1NM91 or list of descriptors in Appendix 1.
5) Resected cases included regardless of margin status (due to data limitations) for 2009, included margins are negative for 2010/2011/2012.
6) Chemotherapy includes oral and IV chemotherapy.
7) Included cases which last resection date (if multiple)-diagnosis date <=365 days. Chemotherapy start date-last resection date (if multiple) <=120 days
8) No filter for treatment intent was used, unless otherwise specified by province for 2009.

Appendix 1

Colon and rectal codes:

<table>
<tr><th></th><th colspan="2">Procedure Codes</th><th colspan="2">Diagnostic codes</th></tr>
<tr><th>Specific Cohort</th><th>CCP</th><th>CCI</th><th>ICD-9-CM</th><th>ICD-10</th></tr>
<tr><td rowspan="2">Colon cancer resections</td><td rowspan="2">57.5*, 57.6*</td><td rowspan="2">1.NM.87.^^, 1.NM.89.^^, 1.NM.91.^^</td><td colspan="2">Only colorectal cancer codes</td></tr>
<tr><td>153*, 154.0, 154.1 154.2, 154.3. 154.8</td><td>C18, C19, C20 C21</td></tr>
<tr><td rowspan="2">Rectal cancer resections</td><td rowspan="2">60.2, 60.24, 60.4, 60.5, 60.51, 60.52, 60.53, 60.55, 60.59</td><td rowspan="2">1.NQ.87.LA, 1.NQ.87.DA, 1.NQ.87.PF, 1.NQ.87.RD, 1.NQ.87.DF, 1.NQ.89.^^</td><td colspan="2">Only colorectal cancer codes</td></tr>
<tr><td>153*, 154.0, 154.1 154.2, 154.3. 154.8</td><td>C18, C19, C20 C21</td></tr>
</table>

Sarcoma codes

ICD-O-3 Histology	English Description
8710	Glomangiosarcoma
8800	Sarcoma
8801	Spindle cell sarcoma
8802	Giant cell sarcoma (except of bone M-9250/3)
8803	Small cell sarcoma
8804	Epithelioid sarcoma
8805	Undifferentiated sarcoma
8806	Desmoplastic small round cell tumour
8810	Fibrosarcoma
8811	Fibromyxosarcoma
8812	Periosteal fibrosarcoma (C40._, C41._)
8813	Fascial fibrosarcoma
8814	Infantile fibrosarcoma
8832	Dermatofibrosarcoma (C44._)
8833	Pigmented dermatofibrosarcoma protuberans (C44._)
8840	Myxosarcoma
8850	Liposarcoma
8851	Liposarcoma, well differentiated
8852	Myxoid liposarcoma
8853	Round cell liposarcoma
8854	Pleomorphic liposarcoma
8855	Mixed liposarcoma
8857	Fibroblastic liposarcoma

8858	Dedifferentiated liposarcoma
8890	Leiomyosarcoma
8891	Epithelioid leiomyosarcoma
8894	Angiomyosarcoma
8895	Myosarcoma
8896	Myxoid leiomyosarcoma
8900	Rhabdomyosarcoma
8901	Pleomorphic rhabdomyosarcoma, adult type
8902	Mixed type rhabdomyosarcoma
8910	Embryonal rhabdomyosarcoma, NOS
8912	Spindle cell rhabdomyosarcoma
8920	Alveolar rhabdomyosarcoma
8921	Rhabdomyosarcoma with ganglionic differentiation
8930	Endometrial stromal sarcoma (C54.1)
8931	Endometrial stromal sarcoma, low grade (C54.1)
8933	Adenosarcoma
8935	Stromal sarcoma
8936	Gastrointestinal stromal sarcoma
8963	Rhabdoid sarcoma
8964	Clear cell sarcoma of kidney (C64.9)
8980	Carcinosarcoma, NOS
8981	Carcinosarcoma, embryonal
8991	Embryonal sarcoma
9040	Synovial sarcoma
9041	Synovial sarcoma, spindle cell
9042	Synovial sarcoma, epithelioid cell

9043	Synovial sarcoma, biphasic
9044	Clear cell sarcoma, NOS (except of kidney M-8964/3)
9051	Sarcomatoid Mesothelioma
9120	Hemangiosarcoma
9124	Kupffer cell sarcoma (C22.0)
9140	Kaposi sarcoma
9170	Lymphangiosarcoma
9180	Osteosarcoma (C40._, C41._)
9181	Chondroblastic osteosarcoma (C40._, C41._)
9182	Fibroblastic osteosarcoma (C40._, C41._)
9183	Telangiectatic osteosarcoma (C40._, C41._)
9184	Osteosarcoma in Paget disease of bone (C40._, C41._)
9185	Small cell osteosarcoma (C40._, C41._)
9186	Central osteosarcoma (C40._, C41._)
9187	Intraosseous well differentiated osteosarcoma (C40._, C41._)
9192	Parosteal osteosarcoma (C40._, C41._)
9193	Periosteal osteosarcoma (C40._, C41._)
9194	High grade surface osteosarcoma (C40._, C41._)
9195	Intracortical osteosarcoma (C40._, C41._)
9220	Chondrosarcoma (C40._, C41._)
9221	Juxtacortical chondrosarcoma (C40._, C41._)
9231	Myxoid chondrosarcoma
9240	Mesenchymal chondrosarcoma
9242	Clear cell chondrosarcoma (C40._, C41._)
9243	Dedifferentiated chondrosarcoma (C40._, C41._)
9250	Giant cell sarcoma of bone

9251	Malignant giant cell tumour of soft parts
9252	Malignant tenosynovial giant cell tumor
9260	Ewing sarcoma
9270	Odontogenic sarcoma
9290	Ameloblastic odontosarcoma
9330	Ameloblastic fibrosarcoma
9342	Odontogenic carcinosarcoma
9442	Gliosarcoma (C71._)
9480	Cerebellar sarcoma, NOS (C71.6) [obs]
9530	Meningial sarcoma
9539	Meningeal sarcomatosis
9581	Alveolar soft part sarcoma
9591	Reticulosarcoma
9662	Hodgkin sarcoma [obs]
9684	Immunoblastic sarcoma
9740	Mast cell sarcoma
9755	Histiocytic sarcoma
9756	Langerhans cell sarcoma
9757	Interdigitating dendritic cell sarcoma
9758	Follicular dendritic cell sarcoma
9930	Myeloid sarcoma (see also M-9861/3)

Clinical Descriptors:

Clinical descriptors for Colon Cancer	Clinical descriptors for Rectal Cancer
right hemicolectomy, left hemicolectomy	anterior resection (overlap with colon cancer above)

segmental colectomy partial colectomy transverse colectomy subtotal coloectomy anterior resection (note overlap with rectal cancer below)	low anterior resection abdominoperineal resection segmental resection rectum Harmann procedure total proctectomy

5. Person Centred-Perspective

Screening for distress

Definition: The extent to which provincial cancer agencies and programs have implemented standardized tools to screen for distress

Extent of Implementation:

1) Province-wide implementation - standardized symptom screening undertaken for at least a portion of patients at each provincial cancer centre and data collected centrally
2) Partial implementation - standardized symptom screening undertaken for at least a portion of patients at selected provincial cancer centres
3) Not provincially coordinated (some local use possible) - provincially managed implementation of symptom screening does not exist; however, some individual centres/regions may use a screening tool but do not report data at a provincial level

Measurement timeframe: 2015

Data source: Provincial cancer agencies

Provinces submitting data: BC, AB, SK, MB, ON, QC, NB, NS, PE, NL

Notes: This indicator measures the extent to which provinces and their cancer programs have implemented standardized tools to screen for patient-reported symptoms such as emotional and physical distress (including pain)**.**

Place of death

*available online only at www.systemperformance.ca

Definition: The percentage of cancer patients who died in hospital versus non-hospital locations (i.e., private home, other)

Numerator: 1) By province: Number of cancer deaths in hospital, private home and other
2) Canada: Number of cancer deaths in hospital, private home and other

Denominator: Number of cancer deaths

Data source: Canadian Vital Statistics – Death Database (annual file)

Measurement timeframe: 2007 to 2011

Provinces/territories with data available: All provinces/territories

Notes:

1) The definition of hospital varied across provinces. Hospices can be classified as "Other" or "Hospital" depending on province.
2) "Other" included other specified locality, other health care facility, private home and unknown localities.

6. Research

Adult Clinical Trial Participation

Definition: The ratio of the total number of all patients aged 19 years or older newly enrolled in cancer-related therapeutic trials or clinical research studies to the projected number of new incident cancer cases (all ages)
Numerator: Number of cancer patients (≥19 years) newly enrolled in cancer-related therapeutic clinical trials or clinical research at provincial cancer centres. For patient enrolled in multiple clinical trials, all occurrences were counted
Denominator: Projected number of new invasive cancer cases (all ages)
Data source: Provincial cancer agencies (numerator), Canadian Cancer Statistics (denominator)
Measurement timeframe: 2014 enrolment year
Stratification variables: Province, disease site (breast, prostate, colorectal, lung, all cancers)
Provinces submitting data: All cancers: BC, AB, SK, MB, ON, NB, NS, PE and NL. By disease site: BC, AB, SK, MB, NB, NS and NL
Province specific notes: AB: Included non-intervention cases
Notes:
1) Projected number of all invasive cancer cases excluded in site cases.
2) Incident cases are estimated for all ages from the Canadian Cancer Statistics.

Pediatric Clinical Trial Participation

*available online only at www.systemperformance.ca

Definition: The ratio of cancer patients aged 18 years or younger who were newly enrolled in Phase 1 to 4 clinical trials (e.g., cancer-related therapeutic clinical trials or clinical research studies) to the total number of cancer patients aged 18 years or younger who were newly referred to children's cancer treatment centres
Numerator: Number of pediatric cancer patients (≤ 18 years) newly enrolled in a cancer-related intervention/ treatment trial or clinical research study at provincial cancer centres
Denominator: Total number of new pediatric cancer cases (≤ 18 years) diagnosed at provincial cancer centres
Data source: C17 Council
Measurement timeframe: 2014 enrolment year
Stratification variables: Province
Provinces submitting data: BC, AB, SK, MB, ON, QC, NS, NL
Notes:
The following cancer centres were included in the calculation of provincial ratios: **BC:** BC Children's Hospital; **AB**: Alberta Children's Hospital, Stollery Children's Hospital; **SK:** Saskatoon Cancer Centre, Allan Blair Cancer Centre; **MB**: Cancer Care Manitoba; **ON:** Hospital for Sick Children, London Health Sciences Centre, McMaster Children's Hospital, Kingston General Hospital, Children's Hospital of Eastern Ontario; **QC:** Montreal Children's Hospital, Hopital Ste-Justine, Centre Hospitalier de Quebec; **NS:** IWK Health Centre; **NL:** Janeway Health Centre.

Cancer Research Investment

*available online only at www.systemperformance.ca

Definition: 1) Distribution of cancer-specific research funding for breast, colorectal, lung and prostate cancers 2) Distribution of new cancer cases in Canada; 3) Distribution of cancer deaths in Canada

Numerator:

1) Investment: Amount of site-specific research investment (in dollars) for breast, prostate, lung, colorectal, or other cancers
2) New cancer cases: Number of site-specific cases for breast, prostate, lung, colorectal, or other cancers
3) Cancer deaths: Number of site-specific deaths from breast, prostate, lung, colorectal, or other cancers

Denominator:

1) Investment: Total amount of site-specific cancer research investment (in dollars)
2) New cancer cases: Total number of new cancer cases
3) Cancer deaths: Total number of cancer deaths

Data source:

1) Investment: Canadian Cancer Research Alliance, Canadian Cancer Research Survey
2) New cases: Statistics Canada (CANSIM Table 103-0550), Canadian Cancer Registry
3) Deaths: Statistics Canada (CANSIM Table 102-0552), Vital Statistics Death Database

Measurement timeframe: 2013 (cancer research investment), 2012 (new cancer cases), 2011 (cancer deaths)

Stratification variables: Disease site (breast, prostate, lung, colorectal, other)

Notes:

'Other' refers to the remaining primary types of cancer listed in ICD-O-3. Included are all other invasive types and in-situ for bladder.

7. Appropriateness

Breast Cancer Screening Outside Guidelines

Definition: The percentage of self-reported screening mammograms performed on women within and outside of the target age range recommended in the Canadian Task Force on Preventive Health Care (CTFPHC) guidelines (ages 50–74). The indicator includes mammograms performed in the previous two years on asymptomatic women

Numerator: Asymptomatic females aged 35+ who reported having had a mammogram within the past two years

Denominator: Total number of asymptomatic females aged 35+ receiving a mammogram within the past two years

Data source: Statistics Canada, Canadian Community Health Survey (CCHS)

CCHS Variable: 1) Ever had a mammogram; 2) Reasons for having mammogram (mark all that apply): Family history; Routine screen; Age; HRT; Lump; Follow-up to breast cancer treatment; Breast problem; Other; 3) Last time respondent had undergone a mammogram

Measurement timeframe: 2012

Stratification variables: Province/territory, age (50-74, <50 and >74)

Notes:

1) Asymptomatic reasons are defined as family history; routine screen/check-up; age; hormone replacement therapy (HRT); and not for any of following reasons: lump; breast problem; follow-up to breast cancer treatment; other.
2) This indicator does not distinguish between women at higher-than-average risk and women of average risk.
3) CCHS data are based on a representative sample which is then extrapolated to the overall population.

Breast Cancer Mastectomies Performed as Day Surgery

Definition: Percentage of mastectomies for breast cancer tumour resection that were done as day surgery. The data are for women with unilateral invasive breast cancer who had surgery between April 2009 and March 2014

Numerator: The number of mastectomies performed as day surgery

Denominator: The number of mastectomies for women aged 18 years or older

Exclusion:

1) Potential duplicate records are identified as discharges with identical values in some of the data elements. In the event that duplicate records are found, the most recent record is retained, the remaining duplicate records are removed
2) Invalid Health Card Number
3) Procedures coded as abandoned
4) Newborns, stillbirths and cadaveric donors
5) Invalid procedure date
6) No discharge procedure laterality assigned
7) Invalid postal codes

Data source: Canadian Institute for Health Information; Hospital Morbidity Database (HMDB); National Ambulatory Care Reporting System; Alberta Ambulatory Care Reporting System

Measurement timeframe: By province - 2009/10 to 2013/14 combined. For trends - 2008/09 to 2010/11 fiscal year combined and 2011/12 to 2013/14 fiscal year combined
Stratification variables: Province/territory
Notes:

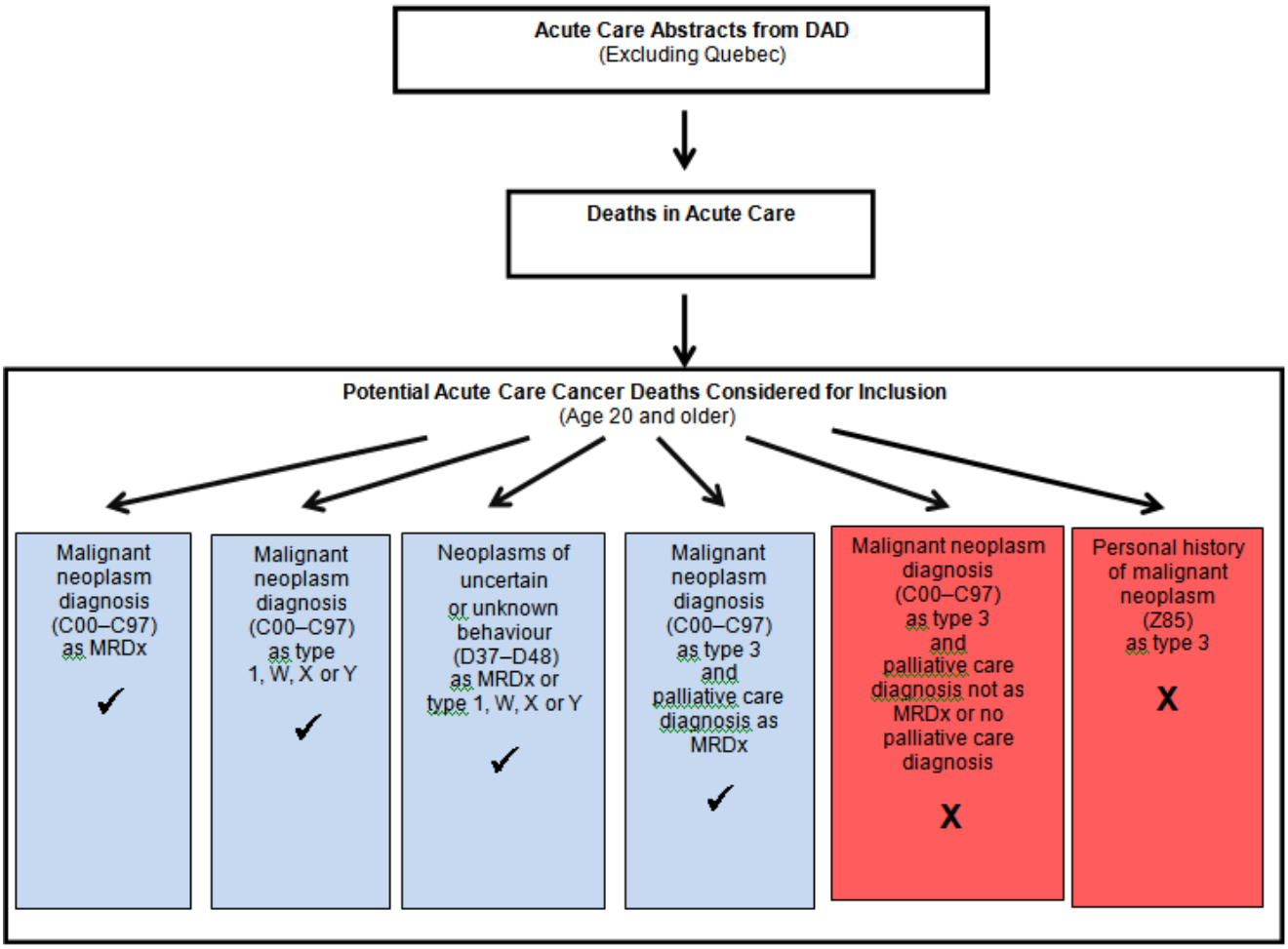
1) Patients receiving a mastectomy anywhere within the discharge record containing the surgical episode associated with the patient's first breast resection are considered mastectomy cases.
2) Territories include Nunavut, Northwest Territories and Yukon.
3) Based on patient's place of residence.
4) Data are collected annually for each individual fiscal year. Since estimates for multiple fiscal years combined require the addition of individual years of data, fiscal years with suppressed data owing to small numbers could not be included in the calculation.

Intensive care use in the last two weeks of life

*available online only at www.systemperformance.ca
Definition: 1) Percentage of cancer patients admitted to an intensive care unit (ICU) in the last 14 days of life 2) Percentage of cancer patients dying in an ICU
Numerator: 1) The number of cancer patients admitted to an ICU in their last 14 days of life. 2) The number of cancer patients who died in an ICU
Denominator: The total number of cancer patients aged 20 years or older who died in hospital
Exclusion: Records submitted by Quebec facilities or records with Quebec-issued health cards
Data source: Canadian Institute for Health Information (CIHI), Discharge Abstract Database
Measurement timeframe: 2011/12 – 2014/15 fiscal year combined
Stratification variables: Province/territory
Notes:

1) Territories include Nunavut, Northwest Territories and Yukon.
2) Based on patient's place of residence.
3) Data included cancer patients who were admitted to an ICU and who died in an ICU at acute-care hospitals from April 2011 to March 2015.
4) Cancer patients were identified using ICD-10-CA codes for either
   a. A significant diagnosis of malignant neoplasm or neoplasms of uncertain or unknown behavior; or
   b. A most responsible diagnosis of palliative care, with a secondary diagnosis of malignant neoplasm (See Appendix A below on how cancer patients were selected)
5) To remove potential reporting bias, only facilities that submitted ICU data were used for the analysis.
6) Only records indicating at least one ICU visit within 14 days of death were included in the percentage of patients admitted to ICU in their last 14 days of life. All cancer patients who died in ICU, regardless of when they were admitted to an ICU, were included in the percentage of cancer patients who died in an ICU.

Appendix A



Legend

✓ Included in the study cohort.

X Excluded from the study cohort.

Notes

MRDx: most responsible diagnosis.
Type 1: significant pre-admit diagnosis.
Type W, X or Y (service transfers diagnosis): significant pre-admit diagnosis.
Type 3: secondary diagnosis.
Not shown in the diagram but also excluded were a few cases of C and D codes that had other diagnosis types.

8. Long-Term Outcomes

Age-standardized Incidence Rates

Definition: The incidence rate that would have occurred if the age distribution in the population of interest was the same as that of the standard, where incidence rate is defined as the number of cases of cancer (malignant neoplasms) newly diagnosed during a year, per 100,000 people at risk
Numerator: Number of new cancer cases (all ages): 1) Breast (female) 2) Colorectal 3) Lung 4) Prostate (male) 5) Pancreas 6) Ovary (female)
Denominator: 1), 6): Annual female population estimate in hundreds of thousands; 2), 3), 5): Annual population estimates in hundreds of thousands 4: Annual male population estimate in hundreds of thousands
Age standardization: Direct method using the 2011 Canadian Census population
Data sources: Canadian Cancer Registry (CCR) Database – cancer incidence data; Demography Division of Statistics Canada – population estimates
Measurement timeframe: For overall trends, Canada – 1992 to 2012. By province - 2010 to 2012 combined
Stratification variables: Province, sex
Notes:

1) World Health Organization, International Classification of Diseases for Oncology, Third Edition (ICD-O-3) and the International Agency for Research on Cancer (IARC) rules for determining multiple primaries sites were used: colorectal (ICD-O-3: C18.0 to C18.9, C19.9, C20.9, C26.0), lung and bronchus (ICD-O-3: C34.0 to C34.9), female breast (ICD-O-3: C50.0 to C50.9), prostate (ICD-O-3: C61.9), pancreas (ICD-O-3: C25.0-C25.9), ovary (ICD-O-3: C56.9)
2) Joinpoint Regression Program 4.2.0.2 for Windows was used to analyze linear trends across years. The software takes trend data and fits the simplest joinpoint model that the data allow. The program starts with the minimum number of joinpoints (e.g. 0 joinpoints, which is a straight line) and tests whether more joinpoints are statistically significant and must be added to the model (up to that maximum number). This enables the user to test whether an apparent change in trend is statistically significant. The tests of significance use a Monte Carlo Permutation method. Annual Percent Change (APC) was reported to characterize trends in cancer rates over time. APC assumes that cancer rates are changing at a constant percentage of the rate of the previous year. The minimum and maximum number of joinpoints used in this analysis were 0 and 4 respectively. For further details, refer to the Joinpoint Regression Program documentation (http://surveillance.cancer.gov/joinpoint/).

Age-standardized Incidence Rates by Stage

Definition: The stage-specific incidence rate that would have occurred if the age distribution in the population of interest was the same as that of the standard, where incidence rate is defined as the number of cases of cancer (malignant neoplasms) newly diagnosed during a specific time period, per 100,000 people at risk. Incidence rates by stage are available for five cancers: breast, lung, colorectal, prostate, and ovarian cancer
Numerator: Number of new cancer cases for each stage during the given time period: 1) Breast (female); 2) Lung; 3) Colorectal; 4) Prostate; 5) Ovarian

Denominator: 1), 5): Population estimate per 100,000 women; 4): Population estimate per 100,000 men; 2), 3): Population estimate per 100,000 population
Measurement timeframe: 2011 to 2013 combined
Stratification variables: Province, stage at diagnosis (including stage I, II, III and IV)
Data sources: Provincial cancer agencies
Provinces submitting data: BC, AB, SK, MB, NB, NS, PE (breast, lung, colorectal, prostate); AB, SK, MB, NS, PE (ovarian)
Age standardization: Direct method using the 2011 Canadian census population
Province specific notes:
AB: Hematology, sarcoma and melanoma morphologies were removed from the site-specific cancers. All 2011-2013 invasive primaries are collaborative staging and once coded there should be no cases with missing/not available stage values. AB used AB's 2012 population provided by Alberta Health Services (DIMR/Analytics) and the standardized 2011 Canadian population weights indicated on CPAC's data specification document. For this indicator, 8002, 8073 and 8803 are included as NSCLC. **SK:** SK-covered population estimates were used as the denominator in all standardized rates. **NS**: Lung (NSCLC + SCLC) also contains cases that could not be classified as either.
Notes:

1) World Health Organization, International Classification of Diseases for Oncology, Third Edition (ICD-O-3) and the International Agency for Research on Cancer (IARC) rules for determining multiple primaries sites were used: colorectal (ICD-O-3: C18.0, C18.2 to C18.9, C19.9, C20.9, C26.0), lung and bronchus (ICD-O-3: C34.0 to C34.9), breast (ICD-O-3: C50.0 to C50.9), prostate (ICD-O-3: C61.9).
2) Appendix C18.1 was excluded from colorectal cancer.
3) Sites with histology codes for lymphoma M-95 to M-98, sarcoma codes– 8800/3 were excluded.
4) Cases for patients with age under 18 at diagnosis were excluded.
5) American Joint Committee on Cancer 7 edition (AJCC 7) was used to classify cancer group stage.

Age-standardized Mortality Rates

Definition: The mortality rate that would have occurred if the age distribution in the population of interest was the same as that of the standard, where mortality rate is defined as the number of deaths due to cancer (malignant neoplasms) in a year per 100,000 people at risk
Numerator: Number of deaths from cancer (all ages): 1) Breast (female); 2) Colorectal; 3) Lung; 4) Prostate (male); 5) Pancreas; 6) Ovary (female)
Denominator: 1), 6): Annual female population estimate in hundreds of thousands. 2), 3), 5): Annual population estimates in hundreds of thousands; 4): Annual male population estimate in hundreds of thousands
Age standardization: Direct method using the 2011 Canadian Census population
Data sources: Canadian Vital Statistics – Death Database – cancer mortality data; Demography Division of Statistics Canada – population estimates
Measurement timeframe: For overall trends, Canada – 1992 to 2011. By province - 2009 to 2011 combined
Stratification variables: Province
Notes:

1) Up to the year 1999, causes of death were coded according to World Health Organization (WHO), International Classification of Diseases, Ninth Revision (ICD-9): Colorectal (ICD-9 153-154), lung (ICD-9: 162), female breast (ICD-9: 174), prostate (ICD-9: 185), pancreas (ICD-9: 157), ovary (ICD-9: 183)

2) After the year 1999, causes of death were coded according to the World Health Organization (WHO), International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10): Colorectal (ICD-10:C18-C20, C26.0), lung (ICD-10 : C34), female breast (ICD-10: C50), prostate (ICD-10: C61), pancreas (ICD-10: C25), ovary (ICD-10: C56.9)
3) Joinpoint Regression Program 4.2.0.2 for Windows was used to analyze linear trends across years. The software takes trend data and fits the simplest joinpoint model that the data allow. The program starts with the minimum number of joinpoints (e.g. 0 joinpoints, which is a straight line) and tests whether more joinpoints are statistically significant and must be added to the model (up to that maximum number). This enables the user to test whether an apparent change in trend is statistically significant. The tests of significance use a Monte Carlo Permutation method. Annual Percent Change (APC) was reported to characterize trends in cancer rates over time. APC assumes that cancer rates are changing at a constant percentage of the rate of the previous year. The minimum and maximum number of joinpoints used in this analysis were 0 and 4 respectively. For further details, refer to the Joinpoint Regression Program documentation (http://surveillance.cancer.gov/joinpoint/).

Special Feature: Five-year Net Survival by Income Quintile for Select Cancers in Canada

This analysis was conducted by the CONCORD-2 Programme at the London School of Hygiene and Tropical Medicine, as a sub-analysis of the CONCORD-2 study that was funded by the Canadian Partnership Against Cancer. Details on methodologies for calculating survival were published in *The Lancet* in 2015 (http://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736%2814%2962038-9.pdf). For specific details related to the survival by income quintile analysis, please refer to the methods section in this special feature section.