British Columbia's

Cancer Control Quality Index (CCQI) Report 2024

Driving Excellence, Defining Care

(Released November 2025)

Driving Excellence, Defining Care

The Provincial Health Services Authority provides services to a diverse population including First Nations, Métis Peoples and Inuit living in various settings and communities across British Columbia. As a provincial network, we operate on the unceded traditional and ancestral lands of First Nations. Our main office is located on the traditional and ancestral lands of the xʷməθkʷəy̓əm (Musqueam), Sḵwx̱wú7mesh (Squamish), and səlilwətaɬ (Tsleil-Waututh) Nations.

Table of Contents

Acknowledgements

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We would like to acknowledge partners across the province, specifically the Regional Health Authorities, key partners who provide care alongside BC Cancer, making an essential contribution to B.C.'s high quality cancer system. In addition, our partners include many primary care and specialist providers, and other health care professionals that provide care to patients around our province.

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Content Development, Analytics and Project Leads

PHSA and BC Cancer Data and Analytics Teams

- William Chong, Kimberly DeVries, Lillian Ding, Ognjenka Djurdjev, Paul Drosinis, Jeremy Hamm, Aubrey Hughes, Vince LaPointe, Loren Li, Le Lin, Ren Lo, Courtney Marusiak, Colleen McGahan, Seyed Ali Mussavi Rizi, Le Nghiem, Nivedha Raveinthiranathan, Rhian Stephens, Dr. Ryan Woods, Dr. Yaling Yin, Zhenrui (Eric) Yu, Ruth Zhang, Susan Parkyn

BC Cancer Indigenous Health and Cultural Safety

- Warren Clarmont, Nivedha Raveinthiranathan, Ashley Tremblay

Primary Care

- Dr. Cathy Clelland

Prevention

- Dr. Fabio Feldman, Dr. Jia Hu, Dr. Shez Kassam, Anthony Leamon, Javis Lui, Dr. Geoffrey Mckee, Trang Nguyen, Dr. Gina Ogilvie, Dr. Cheryl Peters, Jill Reedijk, Dr. Jason Wong, Li Rita Zhang

BC Cancer Screening

- Hugo Britto, Dmitriy Bykov, Dr. Fabio Feldman, Davina Gallagher, Laura Gentile, Edwin Khoo, Dr. Stephen Lam, Rableen Nagra, Estefania Ocampo-Zapata, Mary Nagy, Dr. Lily Proctor, Dr. Jennifer Telford, Dr. Charlotte Yong-Hing

BC Cancer Tumour Groups

- Breast: Dr. Tanya Berrang, Dr. Stephen Chia, Dr. Theodora Koulis, Dr. Nathalie Levasseur, Dr. Elaine McKevitt, Dr. Christine Simmons
- Gynecology (Cervical): Dr. Iwa Kong, Dr. Aalok Kumar, Dr. Janice Kwon, Dr. Hamid Raziee
- Gastrointestinal (Colorectal): Dr. Howard Lim, Dr. Jonathan Loree, Dr. Daniel Renouf, Dr. Tom Wallace
- Genitourinary (Prostate): Dr. Christian Kollmannsberger, Dr. Michael Metcalfe, Dr. Krista Noonan, Dr. Jack Zheng
- Thoracic (Lung): Dr. Carl Brown, Dr. Gordon Buduhan, Dr. Cheryl Ho, Dr. Stephen Lam, Dr. Barb Melosky, Dr. Sophie Sun, Dr. Don Wilson

End of Life

- Dr. Helen Anderson, Dr. Pippa Hawley, Dr. Julia Ridley

Oversight and Planning Team

- PHSA and BC Cancer Data and Analytics Leads: Ognjenka Djurdjev, Alexandra Flatt, Dr. Ryan Woods
- Ministry of Health: Kristy Anderson, Nathalie Darmon, Tracy Martell
- BC Cancer Tumour Group Council: Dr. Christine Simmons
- BC Cancer Executive Leadership: Dr. Kim Chi, Tracy Irwin, Dr. Elaine Wai
- PHSA Communications: Pamela Gole
- Project Management: Mhezbin Dharssi, Kumbirai (Trish) Kujeke, Tiana Low, Elena Miller, Rishamdeep Thind

Executive Summary

Nearly half of Canadians are expected to be diagnosed with cancer at some point in their lives; about half of those diagnosed will likely die from cancer. This report represents the inaugural effort to publicly report on cancer control in B.C., spanning the cancer control continuum from Prevention, Cancer Burden and Screening to Diagnosis, Treatment, Survivorship and End of Life Care. The data contained in this report largely relates to outcomes of cancer patients diagnosed in B.C. between calendar years 2016 and 2021 with additional data on patient follow-up and services received through 2023. The data sources used are outlined in each section. This 2024 edition of the report was based on collective work done to produce the data and narrative content in 2024, however, the report was released in final form in November 2025. Moving forward, the aim is to release this report with a routine cadence, providing ongoing insights into the quality of the cancer care system. The process to develop this report has been extensive and has involved numerous data analysts, physicians and surgeons, epidemiologists, health care administrators and executives, and project management professionals.

This report has been modeled on the framework and indicators reported in the Ontario Health's 2021 Cancer System Quality Index report. We are grateful to Cancer Care Ontario for its support. For purposes of inter-regional comparability, care was taken to replicate the Ontario methodology to the extent possible. Additional efforts were made to augment the Ontario-type analysis with a B.C. context, either in the form of supplementary analysis or new indicators. In releasing this report, we hope that the data provided within will enable cancer system leaders to undertake benchmarking activities comparing outcomes across jurisdictions to motivate cancer system improvements. The following is a summary of each chapter in the report. Chapters discussing specific cancers highlight indicators where B.C. is performing well and areas needing improvement. Those indicators with insufficient analysis to reach a conclusion are not included in the summaries below.

Indigenous Cancer Care

BC Cancer and the regional health authorities are committed to improving cancer outcomes and quality of care for Indigenous patients and families. This includes eradicating Indigenous-specific racism within the cancer care system. As part of this commitment, BC Cancer has established Indigenous Patient Navigator roles at all BC Cancer regional centres. Cultural safety and humility training for non-contract staff is mandatory. In 2017, BC Cancer partnered with the First Nations Health Authority, Métis Nation BC and the BC Association of Aboriginal Friendship Centres to develop and implement B.C.'s first province-wide Indigenous cancer strategy, "Improving Indigenous Cancer Journeys in BC: A Road Map". The Strategy was intended to improve Indigenous cancer outcomes and quality of care along the cancer care continuum, from prevention to survivorship and end-of-life, while acknowledging knowledge development and partnerships as enabling factors. BC Cancer has established an Indigenous Cancer Control team to help implement this Strategy. Work is underway to enable analysis of indicators by specific Indigenous groups, including new data linkages and more robust Indigenous identification files, and inform care delivery processes.

Prevention

Prevention offers the best opportunity to reduce cancer incidence and mortality by addressing modifiable risk factors and improving overall population health. In comparison to the rest of Canada, B.C. reported highest rates of physical activity, similar rates of fruit and vegetable consumption, similar overweight rates, lower obesity rates, similar rates of heavy alcohol consumption and lower rates of cigarette smoking. Vaccination against the human papilloma virus (HPV) is another key opportunity to prevent cancer: in 2023, 82% of 17-year-old females and 80% of 17-year-old males received at least one dose of the HPV vaccine.

All Cancer Types

During 2021, 30,000 British Columbians were diagnosed with cancer and 11,000 died from cancer. Lung cancer was the leading cause of death for both males and females. Despite these jarring numbers, B.C. had the lowest age-standardized cancer incidence rate in Canada and the second lowest age-standardized mortality rate. In 2021, 210,000 individuals who were ever diagnosed with cancer with living in B.C., approximately triple the number from 1996.

Additional indicators in this section include:

- *Cancer Patients Screened for Tobacco Use:* 100% new BC Cancer ambulatory care patients between September 2019 and December 2021 were screened. Canadian Partnership Against Cancer designated B.C. with an overall "Gold" ranking in 2022/23.
- *Attachment to a Primary Care Practitioner or Group Practice:* The attachment rate for adults 17 years and older between 2016 and 2021 ranged from 89-91%. The Ministry of Health has launched the Provincial Attachment System to help unattached residents locate a primary care provider.
- *Emergency hospital admission 30 days leading up to cancer diagnosis:* In 2021, 31% of cancer cases experienced ED admission within 30 days before diagnosis. While this percentage is similar to that of other Canadian provinces, work is required to reduce this number.

Breast Cancer

Breast cancer is the most diagnosed cancer in B.C. women. Nearly 4,300 B.C. women were diagnosed with breast cancer in 2021. During this time, 720 women died from breast cancer. This accounts for the greatest potential life years lost from any medical condition for women.

Areas where B.C. is performing well include:

- *Age-standardized incidence rates* - Relative to other provinces (excluding Quebec), B.C. was projected to experience the second lowest age-standardized female breast cancer incidence rate for 2023 in Canada (120.7 per 100,000 population compared to the Canadian average of 129.9 per 100,000 population).

- *Age-standardized mortality rate* - B.C. was also projected to experience the second lowest age-standardized female breast cancer mortality rate in 2023 (19.3 per 100,000 population compared to the Canadian average of 22.1 per 100,000 population).
- *The positive predictive value of screening mammograms* (~7%) has consistently exceeded Health Canada's targets (5% for first screen, 6% for subsequent screens).
- *Unplanned readmissions and emergency department visits after surgery* - Hospital readmission rates after breast cancer surgery remained constant at 2% between 2018 and 2023 and are similar to Ontario's experience. Several American studies have calculated breast cancer surgery readmission rates to be within 1-3%.
- *The breast conserving surgery (BSC) rate for T1 first primary breast cancers* reached 86% in 2023 and has been increasing over time. The European Society of Breast Cancer Specialists (EUSOMA) has a target BCS rate of 85% for invasive cancers up to 3 cm in size.

Areas with room for improvement include:

- *Breast screening wait time to diagnosis with tissue biopsy* - In 2022, 52.4% of screening participants who had an abnormal mammogram result and needed a tissue biopsy for a definitive diagnosis were diagnosed within 7 weeks compared to 63% in 2019. The national target is 90%. Continued efforts to work with health authorities are underway to streamline processes and improve wait times.
- *The median time from diagnosis to first treatment* - Values ranged from 38-42 days between 2018-2021 for patients diagnosed with stage 1 to 3 breast cancer. For stage 4 patients, the median treatment time ranged from 30-37 days. Although there is no agreed upon specific target for B.C. (or other provinces in Canada) and differences in methods and definitions make jurisdictional comparisons challenging, there is general agreement that there is room for improvement.
- *The rates of neoadjuvant chemotherapy prescribed for triple negative and HER2-positive stage 2-3 breast cancer* - In 2021, the rate of both neoadjuvant and adjuvant chemotherapy for stage 1 (T1C) triple negative breast cancers was 75%, and for Stage 2-3 cancers was 81.7%. The rate of both neoadjuvant and adjuvant chemotherapy (+/- targeted therapy) in stage 1 (T1C) HER2-positive breast cancers was 93.5%, and for Stage 2-3 cancers was 91.9%. Continued room for knowledge transfer, and hence, improvement, exists.

Cervical Cancer

Cervical cancer, while not as prevalent, is the fastest increasing cancer among females in Canada. In 2021, 210 B.C. women were diagnosed with cervical cancer, and 85 women died from it. B.C. has committed to eliminating cervical cancer as part of its 10-year cancer action plan.

Areas where B.C. is performing well include:

- *Age-standardized incidence rates* - B.C. was projected to experience the fourth lowest age-standardized incidence rate for females (7.4 compared to 8.0 for Canada excluding Quebec).
- *Age-standardized mortality rate* - B.C. was projected to have the third lowest age-standardized mortality rate for females, similar to the Canadian average (1.9 age-standardized mortality rate per 100,000 population).

- *Radical hysterectomy procedure performed by a gynecologic oncologist* – Since 2019, Gynecologist Oncologists performed 100% of radical hysterectomies for cervical cancer in B.C., aligning with best practices
- *Radical hysterectomy performed using an open technique* – B.C. transitioned to adopting open surgery as the standard of care for radical hysterectomy, increasing from 43% in 2016 to 100% by 2021.
- *Patients who received definitive radiotherapy with concurrent platinum-based chemotherapy (cisplatin)* - BC Cancer recommends concurrent chemoradiotherapy for all patients receiving definitive radiation for stages 1B1 to 4. In 2021, 81% of stage 1-3 cervical cancer patients in B.C. received radiotherapy with at least one cycle of concurrent cisplatin, and 65% received four or more cycles. B.C.'s rates were found to exceed the targets set in other jurisdictions.

Areas with room for improvement include:

- *Cervix screening participation rate* – In 2023, B.C.'s participation rate had returned to pre-pandemic levels to 63.6%, below the 70% target. Implementation of lower-barrier screening with cervix self-screening is expected to further improve screening participation.

Colorectal Cancer

Colorectal cancer (CRC) is the third most diagnosed cancer in Canada. In 2021, 1,700 men and 1,500 women in B.C. were diagnosed with CRC, and 640 men and 590 women died from it. Nearly 25,000 British Columbians previously diagnosed with CRC were alive in 2022, about three times the number in 1996. Recent decreases in CRC incidence are attributed to the promotion of colon screening, which can detect and remove precancerous polyps. Increasing screening uptake could further reduce CRC incidence.

Areas where B.C. is performing well include:

- *Age-standardized incidence rates are lower than in the rest of Canada* - B.C. was projected to experience the second lowest age-standardized incidence rate for males in 2023 (52.0 compared to 60.5 for Canada excluding Quebec). B.C. was also projected to experience the lowest age-standardized incidence rate in 2023 for females (38.6 compared to 42.7 for Canada excluding Quebec).
- B.C. had the *lowest projected age-standardized mortality rate* for both males (21.0) and females (12.9) across Canada (24.2 for males, 15.7 for females) in 2023.
- *Colon cancer surgery reports with 12 or more nodes examined* - In 2023, in 95% of colon cancer surgeries, 12 or more lymph nodes were examined, exceeding the national target of 90%.
- *Rectal cancer surgery resection reports with involved (positive) circumferential radial margins* – B.C.'s performance in 2023 (7.3%) was below the target of 10% for this indicator.
- *Rectal cancer surgery resection reports with Total Mesorectal Excision (TME) Completeness* - B.C.'s performance has consistently exceeded 90%.

Areas with room for improvement include:

- *Time from diagnosis to first treatment* - In B.C., 50% of CRC cases in 2021 commenced treatment within 37 days, and 75% of cases in 2021 commenced treatment within 61 days. Cancer UK has recommended an ideal wait time of less than one month from diagnosis to first treatment but has recommended start of treatment within two months as a more realistic target.
- *Follow-up colonoscopy within 18 months of initial CRC surgery* – In 2022, 68% of recommended follow-up colonoscopies were performed within 18 months of initial surgery. BC Cancer has recommended surveillance colonoscopy be performed one year after the initial surgery, but sometimes this is delayed by up to 6 months due to the need for chemotherapy after surgery.

Lung Cancer

Lung cancer is the leading cause of cancer death in Canada. In 2021, 1,745 B.C. males were diagnosed with lung cancer, and 1,855 B.C. females were diagnosed. Despite declining incidence rates, lung cancer remains a significant public health issue, causing over 2,200 deaths annually in B.C. In 2022, B.C. became the first province in Canada to launch a province-wide lung cancer screening program for high-risk individuals aged 55-74.

Areas where B.C. is performing well include:

- *Age-standardized incidence rates* - B.C. is projected to have the lowest lung cancer incidence rate for males (53.6 versus the Canadian average of 60.1 per 100,000) and the second lowest for females (56.8 versus the Canadian average of 58.4 per 100,000) in Canada for 2023.
- *Age-standardized mortality rates* - B.C. was projected to experience the lowest age-standardized lung cancer mortality rates for both males (38.8 versus the Canadian average of 48.2 per 100,000)
- *Lung Screening* – In 2022, B.C. became the first province in Canada to launch a province-wide lung cancer screening program for high-risk individuals aged 55-74. In the first 18 months, 8,100 participants were screened, detecting lung cancer at a rate of 16.3 per 1,000 participants. Of the detected cancers, 74% were early stage (stage I/II), marking a significant shift toward earlier detection. By comparison, prior to the screening program's launch in 2021, only 35% of cases were diagnosed at early stages. This shift suggests a potential future reduction in lung cancer mortality.
- *Unplanned emergency department visits within 30 days of discharge from hospital post*-surgery – In 2023, hospital readmission rates within 30 days of lung cancer surgery were 5%, and unplanned emergency department visits were 15%, which were found to be lower or comparable to rates in other jurisdictions.
- 30-*Day and 90-Day Post-Surgery Mortality* - In 2023, the 30- and 90-day post-surgery mortality rates in B.C. were 0.28% and 0.46%, respectively. B.C. thoracic surgery sites have among the lowest postoperative mortality rates in Canada for lung cancer resections.

- *Stage 3 Non-Small Cell Lung Cancer (NSCLC) patients who received immunotherapy following chemoradiation* - In 2021, 68% of stage 3 NSCLC patients in B.C. received immunotherapy after chemoradiation. This rate marks a significant increase since 2018 (9%), coinciding with the approval of Durvalumab in Canada.

Areas with room for improvement include:

- *Time from diagnosis to first non-surgical-treatment* - In B.C., in 2021, 50% of lung cancer cases (excluding surgery) began treatment within 46 days, and 75% within 73 days. For higher-stage disease, these wait times are clinically acceptable and align with other regions. However, time to treatment for early-stage disease is longer compared to other areas.
- *Time from booking form received to surgery* - During the COVID-19 pandemic urgent services like cancer surgery were prioritized over non-urgent surgeries, reducing wait times. However, as normal services resumed, lung cancer surgery wait times in B.C. gradually increased, surpassing pre-COVID levels. In 2023, B.C.'s median wait time of 28 days exceeded Canada's average of 26 days, and the B.C. Ministry set target wait time of 'within 2 weeks.'
- *Limited-stage SCLC patients who received chemoradiation* - In 2021, 40% of LS-SCLC patients received chemoradiation, down from 56.6% in 2018 and lower than rates found in other jurisdictions.

Prostate Cancer

Prostate cancer is the most frequently diagnosed cancer among males in Canada, characterized by high incidence and survival rates, partly due to over-diagnosis. In B.C., incidence rates peaked in the 1990s due to widespread PSA testing but have since declined with more stringent guidelines. In 2021, 3,560 individuals were diagnosed and there were 730 deaths, with high survival rates remaining stable over time.

Areas where B.C. is performing well include:

- *Age-standardized incidence rates* - B.C.'s rates are marginally higher than for most other provinces but lower than the Canadian average (119.1 per 100,000).
- *Unplanned admissions and emergency department visits within 30 days of discharge from hospital post-surgery* - Between 2018 and 2023, hospital readmission rates in B.C. ranged from 4% to 5.5%, while unplanned ED visits decreased from 29% to 22%. Despite higher ED visit rates compared to a meta-analysis, this indicator is performing well as both readmission and ED visit rates have been declining.
- *Low-risk patients who received no treatment* - In 2021, 90% of low-risk patients in B.C. received no treatment, up from 84% in 2018. B.C. was found to be comparable to Ontario in minimizing overtreatment for low-risk prostate cancer patients and has shown a positive trend in further reducing overtreatment.

- *High-risk patients who received Androgen Deprivation Therapy (ADT) while undergoing radiotherapy* - In B.C., 87-89% of high-risk prostate cancer patients received combination ADT and radiation therapy from 2018 to 2021, on par with other jurisdictions. This combination remains the standard of care, and B.C. consistently maintains a high proportion of patients on this treatment.

Areas with room for improvement include:

- *Positive Margins Following Radical (or Total) Prostatectomy: pT2 and pT3* - The positive margin rate in B.C. for radical prostatectomy is 21-28% for pT2 and 49-54% for pT3 cancer, which affects cancer recurrence and must be balanced against preserving urinary and erectile functions. B.C. has room for improvement compared to Ontario's targets of 20% for pT2 and 40% for pT3.
- *New metastatic Castration-Sensitive Prostate Cancer (mCSPC) patients who received Androgen Deprivation Therapy (ADT) with concurrent Androgen Receptor Axis-Targeted Therapies (ARAT)* - In B.C., 7% of mCSPC patients received ADT concurrently with ARAT between 2018 and 2020; the rate spiked to 31% in 2021. Early intensification with an ARAT is standard of care in the mCSPC setting. B.C.'s results for 2021 are comparable to other provinces, but room for improvement exists.

End of Life

The purpose of end-of-life care is to optimize the quality of life for cancer patients by supporting them holistically and minimizing pain and suffering, while also supporting their caregivers. Two indicators were highlighted as part of this chapter: Emergency Department (ED) visits and systemic treatment within the last 30 days of life. Data shows an increasing trend in ED visits at the end of life, indicating potential gaps in community-based palliative care services, while B.C.'s systemic treatment rates align closely with other jurisdictions' targets.

Next Steps

The data in this inaugural report has provided an invaluable opportunity to assess and reflect on the performance of B.C.'s Cancer System. This, however, is just the beginning of our work. Concerted efforts will be made to continue to improve service delivery, care processes and individual health outcomes.

Introduction

Context

Nearly half of Canadians are expected to be diagnosed with cancer at some point in their lives; about half of those diagnosed will likely die from cancer.

The goal of cancer control is to reduce the large burden of cancer on a population. The process of systematically measuring and reporting on the quality of cancer control and healthcare delivery is a central component of every cancer control program.

This report represents the inaugural effort to publicly report on cancer control in B.C, spanning the cancer control continuum from Prevention, Cancer Burden and Screening to Diagnosis, Treatment, Survivorship and End of Life Care. Moving forward, the aim is to release this report periodically, providing ongoing insights into the quality of the cancer care system.

This report contains focused chapters on the four most common cancers: breast, colorectal, lung and prostate cancers. The report also includes a fifth focus chapter on cervical cancer to support the Ministry of Health's commitment of eradicating cervical cancer as part of B.C.'s 10-Year Cancer Action Plan.[1]

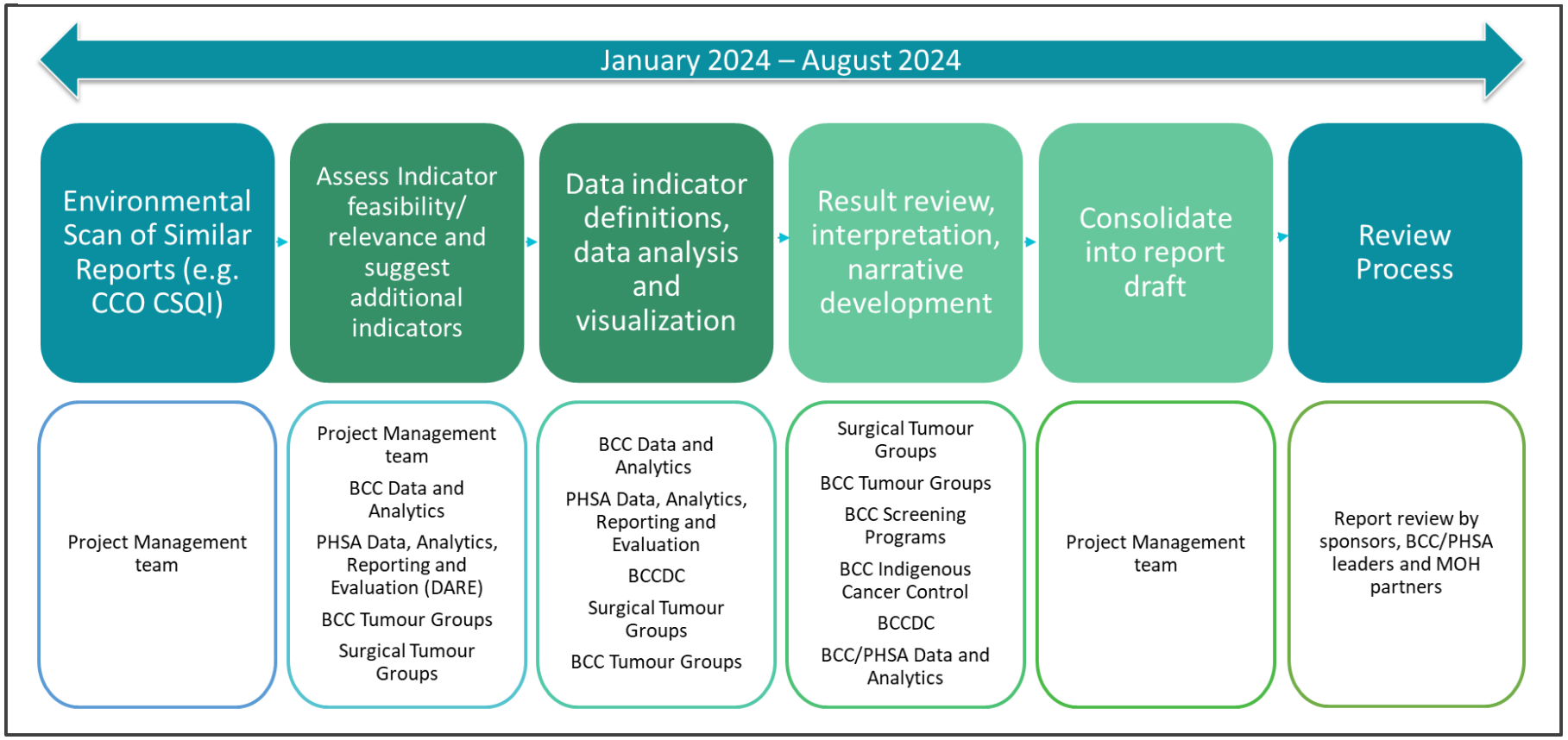
Approach

The report development process was led by the Provincial Health Services Authority (PHSA) and BC Cancer, under the sponsorship of the Strengthened Cancer Action Plan Executive Provincial Steering Committee, with support from the B.C. Ministry of Health.

This report has been modeled on the framework and indicators reported in the Ontario Health's Cancer System Quality Index report. We are most grateful to all the staff at Cancer Care Ontario who supported us in this endeavour. We thank Dr. Munaza Chaudhry for her openness and knowledge in guiding us through the development of this B.C. report.

[1] CancerPlan2023.pdf (gov.bc.ca)

Figure 0-1 Report Development Process



The process for developing this report has been extensive. Steps taken (depicted in the figure on the previous page) include:

- *Undertaking a multi-country jurisdictional scan* to ascertain innovative and best practices for reporting on cancer control.
- *Assessing feasibility* via a high-level analysis of technical reproducibility of the indicators in Ontario's 2021 CSQI report.
- *Gauging suitability* via B.C. subject matter expert review of feasible indicators to determine their suitability to the B.C. context.
- *Incorporating the B.C. context*, specifically the addition of B.C.-specific indicators to complement the indicators already selected from the ON report.
- *Tapping into subject matter expertise* via the establishment of multi-disciplinary expert review groups for each of the five focus disease sites. These medical oncologists, radiation oncologists and surgeons represent a subset of membership of BC Cancer's various Tumour Groups.
- *Data scientists and clinicians collaborating extensively* to review methodologies, data inclusions and exclusions, and data results to ensure validity of the data being presented.
- *Performing rigorous analytics.* Extensive effort was required to remain true to the Ontario methodology for purposes of inter-regional comparability. Additional efforts were made to simultaneously present indicators to reflect the B.C. context when applicable.
- *A review of analysis and confirmation of face validity for all indicators* by subject matter experts including epidemiologists, statisticians, physicians and surgeons.
- *Sound data interpretation and narrative development* with these subject matter experts.
- *A second review of indicator results and the draft report* which was undertaken by subject matter experts, PHSA and BC Cancer leadership and representatives of the Ministry of Health; and
- *Report oversight by the Oversight Committee* - comprising BC Cancer, PHSA, physicians and the Ministry of Health - who provided helpful guidance on report strategy and development.

Indicator Measurement Methods

Measurement methods for the indicators are available in the B.C. CCQI 2024 Technical Supplement.

The data presented throughout the report is for British Columbia and is in calendar years unless otherwise noted.

Defining Cohort Years and Staging: The cancer cohort includes diagnosis years from 2016 to 2021.

For indicators reporting stage data, the cohort includes diagnosis years from 2018 to 2021, using the TNM8 staging system. The American Joint Committee on Cancer (AJCC) transitioned from the TNM7 to the TNM8 staging system in 2018. Stage indicators for years prior to 2018 were not reported to maintain consistency in the staging system. There is an exception for Cervical cancer which underwent a second shift in staging to the TNM9 system in 2021.

Data Availability: Many indicators are reported up to 2021, as the BC Cancer Registry data is complete for cases up to the end of 2021.

Jurisdictional Comparisons

Comparisons to other jurisdictions are made throughout the report and are intended to provide insights into how British Columbia's cancer system compares to other jurisdictions. Making jurisdictional comparisons is challenging due to differences in indicator definitions, measurement methods, and healthcare systems across jurisdictions. Despite these challenges, such comparisons are included to provide a general understanding of how British Columbia compares with other regions.

Intended Audience

The primary audience is health care leaders and senior executives.

COVID-19 Pandemic

The pandemic has influenced some data results in 2020 and 2021. The true impacts of the pandemic will become clearer in the fullness of time.

Report Layout

The report is laid out as follows:

Introduction & Indigenous Cancer Care
Chapter 1: Prevention
Chapter 2: All Cancers
Chapter 3: Breast Cancer
Chapter 4: Cervical Cancer
Chapter 5: Colorectal Cancer
Chapter 6: Lung Cancer
Chapter 7: Prostate Cancer
Chapter 8: End-of-Life Care
Next Steps

Indigenous Cancer Care

Introduction

B.C. is home to over 200 First Nations communities and 39 Métis Chartered communities. B.C. is also home to First Nations (status and non-status, living at home and away from home), Métis (Citizens and self-identified) and Inuit people from across Canada. This diversity among the three distinct Indigenous groups in B.C. reflects a rich history of health, wellness and balance.

Through guidance from our Indigenous partners - the First Nations Health Authority (FNHA), Métis Nation British Columbia (MNBC) and BC Association of Aboriginal Friendship Centres (BCAAFC) - BC Cancer uses the word 'Indigenous' in publications when referring to First Nations, Métis and Inuit people collectively, except in cases where distinction is necessary.

BC Cancer is committed to improving cancer outcomes and quality of care for Indigenous patients and families. This includes eradicating Indigenous-specific racism within the cancer care system. As part of this commitment, BC Cancer has established Indigenous Patient Navigator roles at all BC Cancer regional centres, and Indigenous cultural safety and humility training for non-contract staff is mandatory.

What we know about the indigenous cancer experience in B.C.

First Nations men and women living in B.C. experience a significantly elevated risk of being diagnosed with colon cancer. First Nations women are also more likely to be diagnosed with cervical cancer compared to all other residents, though recent findings suggest that this incidence gap is narrowing. First Nations men and women are less likely to survive a cancer diagnosis.[2]

In 2017, and in response to these findings, BC Cancer partnered with the First Nations Health Authority, Métis Nation BC and the BC Association of Aboriginal Friendship Centres to develop and implement BC's first province-wide Indigenous cancer strategy, titled *Improving Indigenous Cancer Journeys in BC: A Road Map*[3]. The Strategy was intended to improve Indigenous cancer outcomes and quality of care along the cancer care continuum, from prevention to survivorship and end-of-life, while acknowledging knowledge development and partnerships as enabling factors. BC Cancer has established an Indigenous Cancer Control team to help implement this Strategy.

Challenges in describing the Indigenous cancer experience

Understanding the cancer care experience of First Nations, Métis and Inuit people in the province has historically relied on quantitative data based on voluntary and pan-Indigenous self-identity. This means that health system databases, including BC Cancer, have only ever captured voluntary self-identity data which is based on whether the patient chooses to self-identify as 'Aboriginal', or more recently as 'Indigenous'. A pan-Indigenous approach dilutes the uniqueness of each group given the vast differences in culture, language, geography and economic status,

[2] McGahan, C. E., Linn, K., Guno, P., Johnson, H., Coldman, A. J., Spinelli, J. J., & Caron, N. R. (2017). Cancer in First Nations people living in British Columbia, Canada: an analysis of incidence and survival from 1993 to 2010. Cancer causes & control : CCC, 28(10), 1105–1116. https://doi.org/10.1007/s10552-017-0950-7 These findings are a result of analyzing data from 1993-2010. BC Cancer and FNHA are updating this data through a second linkage project; more recent findings from 1993-2019 will be available in 2025-26.

[3] https://www.fnha.ca/WellnessSite/WellnessDocuments/improving-indigenous-cancer-journeys-in-bc.pdf

and ignores the individual characteristics of First Nations, Métis and Inuit peoples respectively.

Further, a pan-Indigenous approach to data collection makes it difficult to align data with community needs and priorities to develop targeted quality improvement strategies. As a result, a pan-Indigenous approach can inadvertently widen disparities between Indigenous people.

It is known through the 'In Plain Sight' report[4] and documented experiences that many Indigenous patients do not feel comfortable disclosing their identity due to past and current negative experiences with the healthcare system. This mistrust of the healthcare system by Indigenous people exists due to the history and current state of Indigenous-specific racism in healthcare. As Indigenous identity disclosure rates are not accurately known, voluntary self-identity approaches may bias findings towards more positive outcomes by reflecting only the experiences of people who feel safe enough to disclose. Another challenge with voluntary self-identity is that it also captures those individuals who may not have had a lived experience as an Indigenous person but have self-identified for other reasons. This includes patients having heard a family story of an ancestor who may have been Indigenous, or those patients that see a direct benefit, financial or otherwise, to identifying as Indigenous.

Lastly, cancer care is a complex continuum spanning from prevention and screening, to treatment, survivorship and/or end of life. It is therefore important to collect and examine quantitative and qualitative data on the entire cancer journey to better understand how the cancer system is performing for First Nations, Métis and Inuit people respectively.

The need for distinctions-based approach

When referring to the Indigenous cancer journey, we are referring to the collective experience that First Nations, Métis and Inuit people have when it comes to cancer; understanding the differences among the three Indigenous groups can positively or negatively impact their care. Historically, BC Cancer has not been able to accurately differentiate cancer outcomes and indicators between each of the three distinct Indigenous groups.

The First Nations Client File (FNCF) is one tool that helps take a distinctions-based approach to describing First Nations cancer outcomes in B.C. The FNCF is generated annually through a multi-step probabilistic record linkage between the Indigenous Services Canada (ISC) Indian Registry, the BC Ministry of Health Client Roster, and BC Vital Statistics records. The ISC Indian Registry is used to identify status and status-eligible First Nations people under the Indian Act; the Client Roster is used to identify B.C. residency as per BC Ministry of Health service eligibility; and Vital Statistics is used to confirm births (to include those individuals eligible for status but not registered) and deaths.

The Métis Client Roster (MCR) is another tool to support distinctions-based data analysis. The MCR is an anonymized, opt-out program developed through Métis Nation BC governance structures. It links MNBC's Métis Citizenship registry and a participant's Personal Health Number through the Office of the Provincial Health Officer. Linking this data allows the MCR to indicate how many Métis Citizens are utilizing health care, in which

[4] In-Plain-Sight-Full-Report-2020.pdf (gov.bc.ca)

regional health authority and anonymized data regarding their health journeys.

Current Work and Moving Forward

Data linkage work with FNHA

Work is underway between BC Cancer and FNHA through a second linkage project to update First Nations cancer indicators and now examine screening indicators as well. This work involves linking the FNCF to provincial health data, including data from the BC Cancer Registry, BC Cancer screening programs and Medical Service Plan.

First Nations outcomes and indicators that are expected to be reported on include: screening participation rates, screening retention rates, resolution of abnormal screen rates, as well as incidence rates, mortality rates and survival rates associated with commonly diagnosed cancers. Regularly reporting on these indicators will allow BC Cancer to monitor progress and set improvement targets, while allowing more steps along the cancer care continuum to be assessed. It will also improve accuracy in determining overall cancer system performance for First Nations people and communities.

Data linkage work with Métis Nation BC (MNBC)

A partnership between BC Cancer and Métis Nation BC on a Métis specific cancer linkage project will provide the first distinctions-based examination into Métis specific cancer outcomes and indicators in British Columbia. As stated, the current collection of cancer data pertaining to Indigenous peoples, including Métis, takes a pan-Indigenous approach and therefore much like First Nations, very little is known about the Métis cancer outcomes and experience in B.C.

Métis outcomes and indicators examined will create a pre-COVID baseline of cancer incidence rate, mortality rates and survival rates associated with many cancer tumour sites. Future Métis cancer linkages will examine screening participation rates in BC Cancer's screening programs and look at comparative outcomes between Métis peoples and all other B.C. residents.

Indigenous patient experience

Numbers only tell part of the story. Behind these numbers exists a legacy of negative experiences and interactions between Indigenous peoples and government institutions, particularly in healthcare. Patient journey mapping is a qualitative, culturally safe method of giving voice to the experiences of individuals, families, and communities as it relates to their interaction with the healthcare system and the care they receive. These experiences are recorded graphically to tell a collective story from a patient's perspective, and from which to then inform service improvements. These stories will complement quantitative outcome data generated by BC Cancer and its Indigenous partners to enable a more comprehensive understanding of First Nations and Métis cancer outcomes and indicators.

Conclusion

Distinctions-based data collection and patient and family engagement are both critical in supporting BC Cancer's efforts to improve cancer outcomes, indicators and quality of care for First Nations, Métis and Inuit patients and families. The Indigenous Cancer Strategy and Provincial Cancer Action Plan provide an opportunity to use new First Nations and Métis data in a way that highlights outcomes and indicators for these two distinct groups, while working closely with the First Nations Health Authority and Métis Nation BC to develop strategies to reduce disparities and regularly monitor and report on progress.

Chapter 1: Prevention

Prevention Summary

Prevention provides the best opportunity to decrease cancer incidence and mortality. Addressing modifiable risk factors for cancer can not only reduce the risk of cancer and other chronic diseases but can improve overall population health.

- In the most recent year for which data was available (i.e. 2021 or 2022), the prevalence of modifiable risk factors among B.C. adults was estimated using self-reported data as follows:
    - 38% of adults were physically inactive;
    - 79% of adults reported insufficient fruit and vegetable intake;
    - 60% of the adult population in B.C. was either overweight or obese;
    - 20% of adults reported heavy alcohol consumption at least once per month; and
    - 10% of adults smoked cigarettes.
- In comparison to the rest of Canada, B.C. reported:
    - Similar overweight rates and lower obesity rates;
    - The highest rates of physical activity and lowest rates of inactive individuals;
    - Similar rates of eating sufficient fruits and vegetables;
    - Similar rates of heavy alcohol consumption;
    - Lower rates of cigarette smoking
- Those in highest income quintiles were more likely to report overweight or obesity and heavy alcohol consumption compared to those in the lowest income quintiles. They were also more likely to be physically active, eat sufficient fruits and vegetables and not smoke cigarettes.
- Those who reported completing post-secondary education were more likely to report overweight (but not obesity) and more heavy alcohol consumption compared to those who reported less than secondary education. They were also more likely to be physically active, eat sufficient fruits and vegetables and not smoke cigarettes.
- HPV immunization can help protect against HPV-related cancers. In 2023, 82% of 17-year-old females and 80% of 17-year-old males received at least one dose of the HPV vaccine.

Modifiable Risk Factors for Cancer

- The World Health Organization estimates that 30-50% of all cancers can be prevented.[1]
- Modifiable risk factors are behaviours and exposures that can raise or lower a person's risk of cancer. They are modifiable because they can, in theory, be changed.[2]
- Prevention provides the best chance of lowering the risk of developing and dying from cancer.
- Addressing modifiable risk factors such as smoking, obesity, physical activity levels, diet, alcohol consumption and viral infections can not only reduce the risk of cancer but can improve overall population health.
- The indicators representing key modifiable risk factors for cancers that are presented in this chapter are:
    - Physical Activity
    - Inadequate Fruit and Vegetable Consumption
    - Overweight and Obesity
    - Excess Alcohol Consumption
    - Tobacco Smoking
    - Lack of HPV Vaccination

Data source for modifiable risk factors

The data presented and discussed for modifiable risk factors in this chapter, except for the HPV vaccination data, are from the 2022 Canadian Community Health Survey (CCHS). The CCHS is a national survey that collects information related to health status, health care utilization, and health determinants for the Canadian population.[3]

The HPV vaccination data based on a record of receiving the HPV vaccine in the provincial immunization registry among Grade 6 students enrolled in school (including students who are home schooled) or who turned 17 years old that year. The provincial immunization registry includes all vaccines administered by public health, reported by a parent/guardian to public health (e.g., for children arriving from outside of B.C.), or if reported by a primary care provider to public health. Doses administered by pharmacists and entered in PharmaNet are also recorded in the provincial immunization registry.

Prevalence of physical activity

- Physical activity is a well-established factor in maintaining good health and reducing the risk of developing several types of cancers, including lung, colorectal, breast, and genitourinary cancers.
- In B.C., 8.4% and 6.5% of all cancers can be attributed to physical inactivity and sedentary behaviour, respectively.[4]
- Current recommendations for physical activity in adults 18 years and older include participation in moderate-to-vigorous intensity aerobic physical activity for 150 minutes per week.[5]
- B.C. has the highest rates of moderate physical activity and lowest rates of inactive individuals amongst all provinces and territories.
- Monitoring the proportion of the population that meets recommended physical activity levels provides insight into public health efforts to encourage a more active lifestyle, which is crucial for both preventing cancer and other chronic diseases and promoting overall health, regardless of body size.
- In 2021, 62.4% of adults in B.C. self-reported meeting physical activity recommendations, as compared to 53.9% in Canada.
- The percentage of adults who met physical activity guidelines decreased slightly from 64.9% in 2017 to 62.4% in 2021.
- For younger adults (18-34 years), there was a significant decline in meeting physical activity recommendations from 73.3% in 2017 to 64.2% in 2021.
- Among B.C. adults, meeting physical activity recommendations in 2021 was higher in:
    - Males (66.2%) versus females (58.7%)
    - Those from the highest household income quintiles (70.5%) versus those in the lowest household income quintiles (53.8%)
    - Those who completed post-secondary education (64.3%) versus those with less than secondary education (39.0%)
    - Note: data for 2019 and 2022 were not available.
- A significant proportion – higher than the Canadian average – of B.C.'s adult population meets physical activity guideline recommendations. However, the decline in physical activity among adults aged 18-34 and significant differences in physical activity, particularly among those with lower educational attainment, highlights the need for continued public health initiatives to reduce health disparities related to insufficient physical activity.

Table 1-1 Proportion of B.C. adults meeting physical activity recommendations

Year	Males (%)	Females (%)	Males and Females (%)
2017	67.6	62.3	64.9
2018	67.2	62.2	64.7
2019	..	..	..
2020*	65.2	63.9	64.5
2021	66.2	58.7	62.4
2022	..	..	..
2021 (Canada)	56.9	51.0	53.9

* The COVID-19 pandemic had major impacts on the data collection operations for the Canadian Community Health Survey 2020. Users are advised to use the 2020 data with caution.

.. not available for a specific reference period

Notes: Adults are defined as ages 18 years and older.

Physical activity recommendation is to participate in at least 150 minutes of moderate to vigorous intensity aerobic physical activity per week, in bouts of 10 minutes or more.

A detailed data table, displaying age brackets, household income, and education level, is available in the Technical Supplement.

Prevalence of inadequate vegetable and fruit consumption

- Consuming a diet rich in fruits and vegetables is linked to a reduced risk of many diseases, including lung, colorectal, breast, pancreatic, and head and neck cancers.[6]
- In B.C., 7.5% and 3.9% of all cancers can be attributed to low fruit and low vegetable intake, respectively[4]. Public health initiatives often focus on increasing the intake of fruits and vegetables as a preventive measure against cancer and other chronic diseases.
- In B.C., 21.2% of adults self-reported eating fruit and vegetables five or more times per day in 2021, which is similar to the rest of Canada (21.8%).
- There was a significant decrease in the proportion of adults who reported eating fruit and vegetables five or more times per day, from 28.9% in 2017 to 21.2 % in 2021.
- While all age ranges showed a reduction in fruit and vegetable consumption, the largest decline was seen in those aged 18-34 from 27.3% in 2017 to only 14.5% in 2021.
- Among B.C. adults, eating fruit and vegetables five or more times per day in 2021 was higher in:
    - Females (25.3%) versus males (16.8%)
    - Those from the highest household income quintiles (23.8%) versus those in the lowest household income quintiles (15.9%)
    - Those who completed post-secondary education (21.8%) versus those with less than secondary education (15.9%)
- Data for 2018, 2019, and 2022 were not available.
- The observed decrease in fruit and vegetable consumption among adults in B.C. is concerning. This suggests a need for enhanced public health strategies to increase fruit and vegetable consumption as a preventive measure against cancer.
- These approaches must consider issues of food insecurity, Indigenous food sovereignty, and social and structural determinants of health, particularly given the differences observed in fruit and vegetable consumption by income and education level.

Table 1-2 Proportion of B.C. adults who reported eating fruit and vegetables 5 or more times per day

Year	Males (%)	Females (%)	Males and Females (%)
2017	21.8	35.7	28.9
2018	..	..	..
2019	..	..	..
2020*	17.7	30.7	24.4
2021	16.8	25.3	21.2
2022	..	..	..
2021 (Canada)	17.8	25.6	21.8

* The COVID-19 pandemic had major impacts on the data collection operations for the Canadian Community Health Survey 2020. Users are advised to use the 2020 data with caution.

.. not available for a specific reference period

Notes: Adults are defined as ages 18 years and older.

A detailed data table, displaying age brackets, household income, and education level, is available in the Technical Supplement.

Prevalence of overweight or obesity

- Overweight and obesity are significant risk factors for colorectal, breast and endometrial cancers, as well as other health issues such as cardiovascular disease and diabetes.[3]
- In B.C., 4.6% of all cancers can be attributed to excess weight as measured by Body Mass Index (BMI), as well as 7.3% and 6.3% of all cancers if measured using waist circumference and hip-to-waist ratio, respectively.[7]
- Monitoring the prevalence of overweight and obesity in the population can help gauge the effectiveness of public health policies aimed at managing body weight.
- Overall, the proportion of adults who were classified as overweight remained stable from 2017-2022 but the proportion of adults who were classified as obese increased during that period.
- Rates for overweight are similar between B.C. and Canada, and rates for obesity are lower in B.C. than Canada.

Overweight

- In B.C., 34.7% of adults 18 years and older were determined to be overweight based on reported height and weight in 2022, which was the same proportion as in Canada (34.7%)
- The proportion of adults considered overweight has been relatively stable – 34.9% in 2017 to 34.7% in 2022.
- Among younger adults (18-34 years), the proportion reporting being overweight declined from 32.1% in 2017 to 28.1% in 2022.
- Among B.C. adults, being classified as overweight in 2022 was higher in:
    - Males (40.9%) versus females (28.6%)
    - Those from the highest household income quintiles (36.5%) versus those in the lowest household income quintiles (32.4%)
    - Those who completed post-secondary education (34.9%) versus those with less than secondary education (30.5%)

Obesity

- In B.C., 25.5% of adults 18 years and older were determined to be obese based on reported height and weight in 2022, as compared to 30.0% in Canada.
- The proportion of the B.C. adult population (18 years and older) classified as obese based on reported height and weight has trended upwards from 21.8% in 2017 to 25.5% in 2022.
- The increase is notable among younger adults (18-34 years), where obesity rates rose from 12.7% in 2017 to 20.6% in 2022.
- Among B.C. adults, being classified as obese in 2022 was higher in:
    - Males (26.3%) versus females (24.8%)
    - Those from the highest household income quintiles (24.9%) versus those in the lowest household income quintiles (21.8%)
    - Those with less than secondary education (29.4%) versus those who completed post-secondary education (24.5%)

- Increasing rates of obesity in B.C. and in Canada underscores the ongoing challenges and complex nature of weight management at the individual and population level.
- To promote the maintenance of a healthy body size for cancer prevention, multifaceted public health strategies alongside clinical care practices must be utilized.

Table 1-3 Prevalence of overweight or obesity in B.C. for adults

Year	Males (%)	Females (%)	Males and Females (%)
2017	63.0	50.4	56.7
2018	67.0	49.7	58.3
2019	64.7	50.8	57.6
2020*	65.4	54.2	59.8
2021	64.6	53.6	59.1
2022	67.2	53.4	60.2
2022 (Canada)	69.8	59.6	64.7

* The COVID-19 pandemic had major impacts on the data collection operations for the Canadian Community Health Survey 2020. Users are advised to use the 2020 data with caution.

Notes: Adults are defined as ages 18 years and older.

Body mass index (BMI) is calculated by dividing the respondent's body weight (in kilograms) by their height (in metres) squared. According to the World Health Organization (WHO) and Health Canada guidelines, the index for body weight classification for the population aged 18 and older is: less than 18.50 (underweight); 18.50 to 24.99 (normal weight); 25.00 to 29.99 (overweight); 30.00 or greater (obese).

A detailed data table, displaying age brackets, household income, and education level, is available in the Technical Supplement.

Prevalence of excess alcohol consumption

- Alcohol consumption is associated with an increased risk of several types of cancer, including liver, breast, and colorectal cancers.[3]
- In B.C., 5.3% of all cancers can be attributed to alcohol.[4]
- Many cancer prevention organizations endorse Canada's Guidance on Alcohol and Health (2023), which includes a continuum of risk associated with increasing alcohol consumption.[8]
- For those choosing to drink alcohol, the recommendation is no more than two standard drinks per week to avoid alcohol-related harms.
- In B.C., 20.1% of adults 18 years and older self-reported heavy alcohol consumption in 2022, as compared to 21.0% in Canada. Heavy drinking refers to males who reported having 5 or more alcoholic drinks, or females who reported having 4 or more drinks, on one occasion, at least once a month in the past year.
- A fluctuating trend is observed from 2017 to 2022, with an initial rate of 18.8% in 2017, peaking at 21.3% in 2018, and then declining to 20.1% in 2022.
- While the proportion of adults who drank heavily did not change from 2017 to 2022 overall, among adults 35-49 years there was a significant increase from 18.9% to 24.9% during this time period.
- Among B.C. adults, heavy alcohol consumption in 2022 was higher in:
  - Males (23.2%) versus females (17.1%)
  - Those from the highest household income quintiles (24.6%) versus those in the lowest household income quintiles (13.7%)
  - Those who completed post-secondary education (18.9%) versus those with less than secondary education (11.5%)
- Overall, levels of alcohol consumption were not significantly different in 2022 as compared to 2017, with about one in five drinking heavily at least once a month.
- Increasing awareness about the link between alcohol and cancer, targeted prevention programs, and policy reforms should be leveraged to reduce risk of cancer due to alcohol consumption.

Table 1-4 Prevalence of B.C. adults who reported heavy consumption of alcoholic beverages at least once a month

Year	Males (%)	Females (%)	Males and Females (%)
2017	23.9	13.9	18.8
2018	26.3	16.5	21.3
2019	22.9	16.0	19.4
2020*	21.4	15.1	18.2
2021	19.3	12.7	15.9
2022	23.2	17.1	20.1
2022 (Canada)	24.5	17.6	21.0

* The COVID-19 pandemic had major impacts on the data collection operations for the Canadian Community Health Survey 2020. Users are advised to use the 2020 data with caution.

Notes: Adults are defined as ages 18 years and older.

A detailed data table, displaying age brackets, household income, and education level, is available in the Technical Supplement.

Prevalence of tobacco smoking

- Smoking - the leading preventable cause of premature death in Canada - remains a critical public health concern due to its strong association with various forms of cancer, particularly lung cancer.[9]
- In B.C., 27.7% of all cancers can be attributed to smoking.[4] Reducing the prevalence of commercial tobacco smoking is a major priority for improving public health outcomes and reducing the burden of cancer.
- In B.C., 9.5% of adults 18 years and older self-reported cigarette smoking (daily or occasionally) in 2022, as compared to 12.5% in Canada.
- The proportion of the B.C. adult population who smoke cigarettes has significantly declined from 14.0% in 2017 to 9.5% in 2022.
- Young adults aged 18-34 years have also shown a significant decrease in cigarette smoking rates from 16.2% in 2017 to 8.9% in 2022.
- Among B.C. adults, smoking rates in 2022 were higher in:
  - Males (11.3%) versus females (7.7%)
  - Those from the lowest household income quintiles (11.5%) versus those in the highest household income quintiles (7.0%)
  - Those with less than secondary education (16.9%) versus those who completed post-secondary education (7.6%)
- The decline in smoking rates across different age groups in B.C. provides evidence that public health interventions have been effective, ranging from supportive smoking cessation programs and youth-focused services to restricting cigarette smoking in many public spaces and workplaces.
- Ongoing efforts are still required to further reduce rates in the province, with a particular focus on equity-deserving groups.

Table 1-5 Prevalence of B.C. adults who smoke cigarettes (daily or occasionally)

Year	Males (%)	Females (%)	Males and Females (%)
2017	18.3	9.8	14.0
2018	14.7	10.9	12.8
2019	14.1	9.4	11.7
2020*	12.7	8.6	10.6
2021	12.3	8.3	10.3
2022	11.3	7.7	9.5
2022 (Canada)	14.4	10.6	12.5

* The COVID-19 pandemic had major impacts on the data collection operations for the Canadian Community Health Survey 2020. Users are advised to use the 2020 data with caution.

Notes: Adults are defined as ages 18 years and older.

A detailed data table, displaying age brackets, household income, and education level, is available in the Technical Supplement.

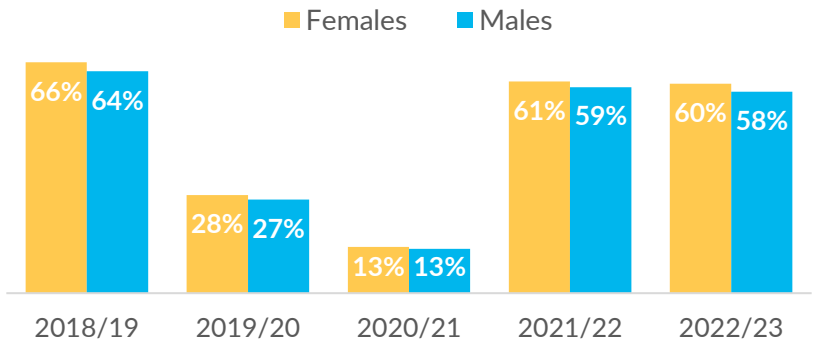
Human Papillomavirus (HPV) Immunization

- HPV is known to cause several types of cancers including cervical cancer, anal cancer, and cancers of the mouth and throat, penis, vagina, and vulva. It also causes genital warts. HPV immunization can help protect against HPV-related cancers.

Immunization coverage for grade 6 students

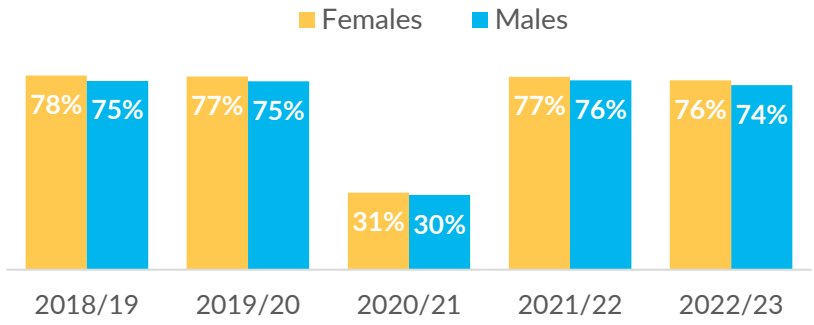
- In B.C. the HPV vaccine is offered to all students in grade 6 through a school-based immunization program.
- Those who miss getting the HPV vaccine in grade 6 can contact their immunization provider to make an appointment to get vaccinated.[10]
- The COVID-19 pandemic significantly disrupted the delivery of the program, prompting the implementation of catch-up initiatives to immunize students who missed their vaccinations.
- At the end of the 2022/23 school year, 60% of female and 58% of male grade 6 students were up-to-date for HPV immunization and 76% of female and 74% of male grade 6 students received at least one dose of the HPV vaccine. Immunization rates are now returning to pre-pandemic levels.
- There is emerging data to indicate that single-dose schedules provide similar efficacy to the two or three-dose schedules for most adolescents.[11]

Figure 1-1 Percent of grade 6 students with up-to-date HPV immunizations



Notes: Coverage reported for any given year reflects doses recorded as administered up to June 30 of that year from the provincial immunization registry (e.g., 2022/23 coverage is for students completing grade 6 by June 30, 2023). Students were up to date for HPV if they completed a valid two or three-dose series based on age at commencement of series.

Figure 1-2 Percent of Grade 6 students who had a least one dose of the HPV vaccine



Immunization coverage for 17 year olds

- The Canadian Partnership Against Cancer has set a target of achieving 90% HPV immunization coverage of adolescents by 17 years of age, by 2025.[12]
- Immunization uptake for 17-year-old females in B.C. has consistently increased, with 66% having at least one dose of the HPV vaccine in 2019, rising to 82% in 2023.
- The HPV program was expanded in 2017 to include males in grade 6 (birth year cohort 2006). These individuals turned 17 in 2023. Thus, the high proportion of males who have received one or more doses is much higher in 2023 compared to previous years.

Figure 1-3 Percent of 17-year-olds who had at least two doses of the HPV vaccine

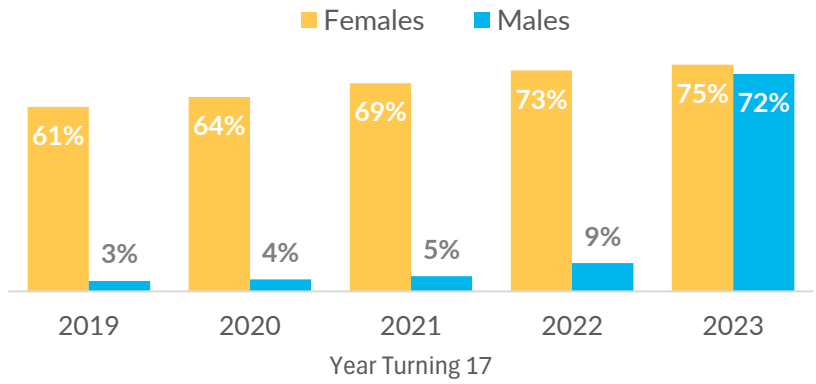
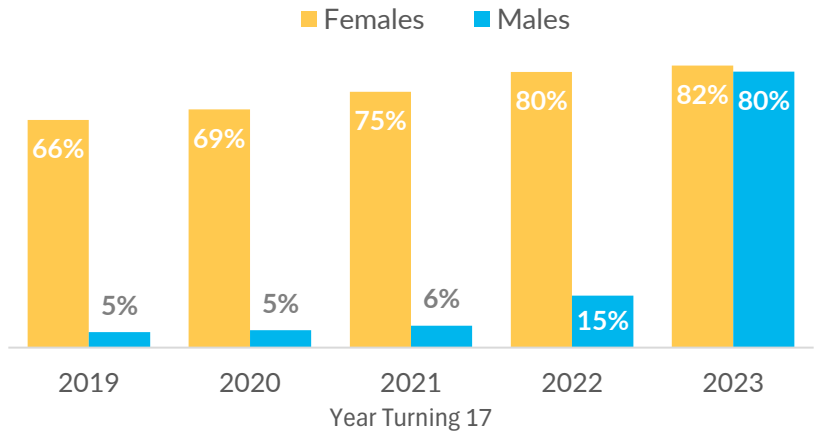


Figure 1-4 Percent of 17-year-olds who had at least one dose of the HPV vaccine



Chapter End Notes

[1] WHO. Preventing cancer [Internet]. Who.int. 2019. Available from: https://www.who.int/activities/preventing-cancer

[2] Modifiable Risk Factors | Cancer Care Ontario [Internet]. www.cancercareontario.ca. [cited 2024 Jun 14]. Available from: https://www.cancercareontario.ca/en/data-research/view-data/modifiable-risk-factors#:~:text=tobacco%20use

[3] Statistics Canada. Canadian Community Health Survey (CCHS) - Annual Component [Internet]. Ottawa (ON): Statistics Canada; [modified 2021 Jun 23; cited 2024 Jun 19]. Available from: https://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=3226&lang=en&db=imdb&adm=8&dis=2

[4] Canadian Partnership Against Cancer. Risk factors [Internet]. Toronto, ON: Canadian Partnership Against Cancer; 2023 [cited 2024 Jun]. Available from: https://data.prevent.cancer.ca/current/risk-factors

[5] CSEP Physical Activity Guidelines [Internet]. Ottawa (ON): Canadian Society for Exercise Physiology; c2022 [cited 2024 Jun 20]. Available from: https://csepguidelines.ca/

[6] World Cancer Research Fund/American Institute for Cancer Research. Diet, Nutrition, Physical Activity and Cancer: a Global Perspective. The Third Expert Report. Available from: https://www.wcrf.org/dietandcancer

[7] ComPARe. (2015). Compare study on preventable cancers in Canada. Retrieved April 24, 2024, Available from https://prevent.cancer.ca/

[8] Paradis, C., Butt, P., Shield, K., Poole, N., Wells, S., Naimi, T., Sherk, A., & the Low-Risk Alcohol Drinking Guidelines Scientific Expert Panels. (2023). Canada's Guidance on Alcohol and Health: Final Report. Ottawa, Ont.: Canadian Centre on Substance Use and Addiction

[9] International Agency for Research on Cancer. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Volume 100E. A Review of Human Carcinogens. Part E: Personal Habits and Indoor Combustions.; 2012.

[10] Human papillomavirus (HPV9) vaccine [Internet]. Immunize BC. 2011. Available from: Human papillomavirus (HPV9) vaccine | Immunize BC

[11] World Health Organization. Human papillomavirus vaccines: WHO position paper (2022 update). Wkly Epidemiol Rec. 2022;97(50):645-72. Available from: https://www.who.int/publications/i/item/who-wer9750-645-672

[12] Canadian Partnership Against Cancer. Action Plan for the Elimination of Cervical Cancer in Canada 2020–2030. [Internet]. Available from: https://s22457.pcdn.co/wp-content/uploads/2020/11/Elimination-cervical-cancer-action-plan-EN.pdf

Chapter 2: Cancer, All Types

Cancer, All Types Summary

Nearly half of Canadians (45%) are expected to be diagnosed with cancer at some point in their lives; 22% of Canadians will die from cancer.

In B.C. during 2021, 30,000 people were diagnosed with cancer and 11,000 people died from cancer. More than 210,000 individuals ever diagnosed with cancer were living in B.C.

This chapter presents four indicators that apply to all cancers:

- Total cancer burden - B.C. was projected to have the lowest cancer age-standardized incidence rates in Canada (excluding Quebec) for 2023, and the second lowest male and lowest female all cancer age-standardized mortality rate in Canada.

  The burden of cancer is increasing. Incident cancer cases in B.C. are expected to rise from 30,000 in 2021 to 45,000 in 2034.

  Nearly 11,000 individuals in B.C. died from cancer in 2021. B.C. has seen a strong decline in cancer mortality rates over the past decades due to efforts in primary prevention, investments in cancer screening, and improved treatments for cancer. The increasing number of people diagnosed with and surviving cancer each year will continue to push demand for cancer services higher.

  Population growth and ageing, coupled with improved cancer outcomes, have resulted in increasing numbers of British Columbians living with, and beyond, a cancer diagnosis. Over 210,000 individuals diagnosed with cancer were living in B.C. at the start of 2022.

- Cancer Patients Screened for Tobacco Use - All new ambulatory care cancer patients in B.C. between September 2019 and December 2021 were screened for tobacco use. The Canadian Partnership Against Cancer designated B.C. with an overall “Gold” ranking in 2022/23. This program will continue to be offered across B.C.

- Attachment to a Primary Care Practitioner or Group Practice - Adults 17 years and older experienced primary care provider attachment rates ranging from 89-91% between 2016 and 2021. The high rate of attachment for adults is driven by those 65 years and older. In July 2023, the B.C. Ministry of Health and its partners launched the Provincial Attachment System as part of the Ministry’s Primary Care Strategy to increase the patient attachment rate.

- Emergency hospital admission 30 days leading up to cancer diagnosis - In 2021, 31% of diagnosed B.C. cancer cases experienced an emergency hospital admission in the 30 days leading up to the diagnosis. This is similar to the experience of other Canadian provinces. Research has shown that this diagnostic pathway may be associated with poorer survival and patient-reported outcomes, even after adjusting for stage at diagnosis, possibly due to delayed action on the patient’s part to seek help or due to long waits for testing and care.

Cancer Burden

Data Sources

The main data source used in this section was the BC Cancer Registry, which at the time of this analysis included all cases of cancer among BC residents to the end of 2021. Some indicators in this section are supported by linkage of the BC Cancer Registry to other data including the Discharge Abstract Database, the Health System Matrix and data collected in the BC Cancer centre electronic medical record. More details on data sources can be found in the accompanying technical appendix for this report.

Incidence, mortality, and prevalence

- Nearly half of Canadians (45%) are expected to be diagnosed with cancer at some point in their lives, and 22% of Canadians will die from cancer.[1]
- Nearly half of the cancers diagnosed in B.C. in 2021 (48%) belonged to one of the following four disease sites: lung, breast, prostate and colorectal cancer.
- In B.C., the age-standardized cancer incidence rate among females gradually increased from 1970 (430 per 100,000), to a notable peak in 2012 (534 per 100,000); since this peak, the rate of all cancer incidence has declined slightly. In 2021, 14,700 females were diagnosed with cancer in B.C. This represents an age-standardized cancer incidence rate of 500 per 100,000.
- Breast cancer was the most diagnosed (29%) in females, followed by lung (12%), colorectal (10%) and uterine (7%) cancers.
- The age-standardized incidence rate in males has declined since 1993 from 746 per 100,000 to 571 per 100,000 in 2021. Overall, 15,500 males were diagnosed with cancer in B.C. in 2021.
- Prostate cancer was the most diagnosed (23%) in males, followed by lung (11%), colorectal (11%) and bladder (8%) cancers.
- In 2021, 5,050 females and 5,770 males died from cancer in B.C.
- For females, lung cancer was the leading cause of cancer death (22% of all cancer deaths), followed by breast (14%), colorectal (11%) and pancreatic (8%) cancers.
- Lung cancer was also the leading cause of cancer death in males (20%), followed by prostate (12%), colorectal (11%) and pancreatic (8%) cancers.
- For both males and females, the age-standardized all cancer mortality rate steadily declined over time. In females, the age-standardized all cancer mortality rate declined from 191 per 100,000 in 1995 to 144 per 100,000 in 2021. Similarly, the age-standardized all cancer mortality decreased in males from 281 to 193 per 100,000, respectively.
- The prevalence of British Columbians ever diagnosed with cancer has increased. Over 210,000 individuals diagnosed with cancer were living in B.C. at the start of 2022, about triple that in 1996.
- In 2022, 57% of these individuals had been diagnosed more than five years previously, compared to 38% of individuals in 1996.
- B.C. was projected to have the lowest cancer age-standardized incidence rates for males in Canada (excluding

Quebec) for 2023 (507 vs. 555 per 100,000) as well as for females (426 vs. 481 per 100,000).[2]

- The decreasing all cancer incidence rates among males can be largely attributed to declining incidence rates of prostate, lung and most recently colorectal cancers in B.C.
- B.C. was projected to have the second lowest male all cancer age-standardized mortality rate in Canada (200 vs. 212 per 100,000). Only Alberta was lower at 196 per 100,000.[3] For females, B.C. was projected to have the lowest cancer age-standardized mortality rate in Canada (141 vs. 155 per 100,000).
- The burden of cancer in B.C. is increasing. Incident cancer cases in B.C. are expected to rise from 30,000 in 2021 to 45,000 in 2034.[4] Population growth and ageing, coupled with improved cancer outcomes, have resulted in increasing numbers of British Columbians living with, and beyond, a cancer diagnosis.
- B.C. has seen a strong decline in cancer mortality rates over the past decades due to efforts in primary prevention, investments in cancer screening, and improved treatments for cancer. Despite these encouraging results, the increased number of people diagnosed with and surviving cancer within our growing and ageing population will continue to push demand for cancer services higher each year.

Table 2-1 All cancer prevalence 2022

Year	Limited Duration (years)	Prevalence count
2022	0 to 1	22,413
2022	>1 to 5	68,365
2022	>5 to 10	59,076
2022	>10 to 20	63,935

Notes: Prevalence reported as of January 1, 2022.

Limited duration (years) refers to the time since a cancer diagnosis, categorized to show the prevalence of cancer by years since diagnosis.

Figure 2-1 All cancer prevalence trend – annual prevalence counts by years since diagnosis

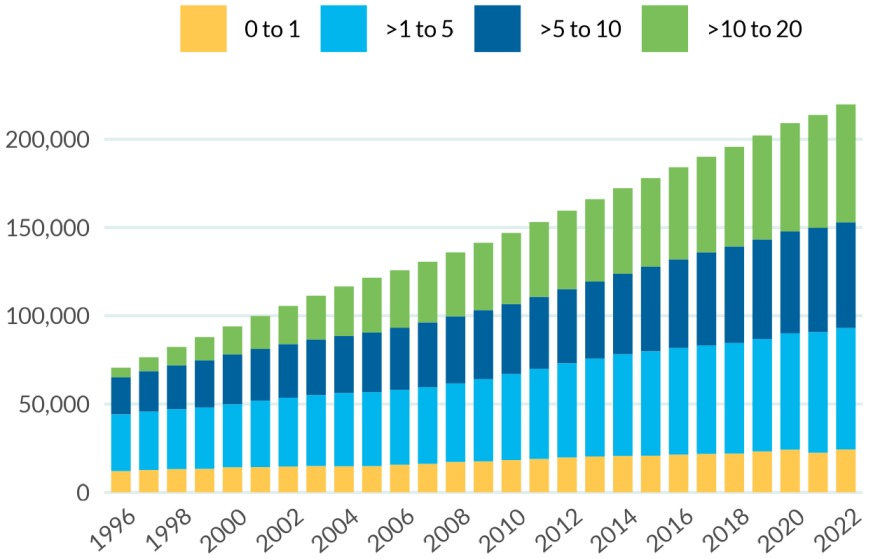


Table 2-2 All cancer incidence 2021

Year	Sex	Incidence count	Age-std incidence rate (ASIR, per 100,000)
2021	F	14,725	500.4
2021	M	15,530	571.1

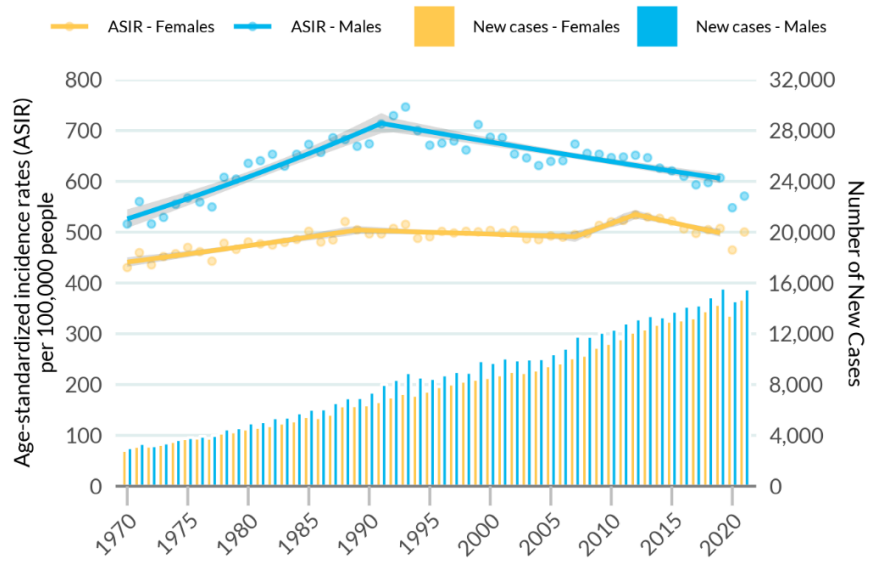
Note: Standardized to 2011 Canadian Standard Population (Statistics Canada 2011 census)

Table 2-3 All cancer mortality 2021

Year	Sex	Mortality count	Age-std mortality rate (ASMR, per 100,000)
2021	F	5,050	143.7
2021	M	5,770	192.7

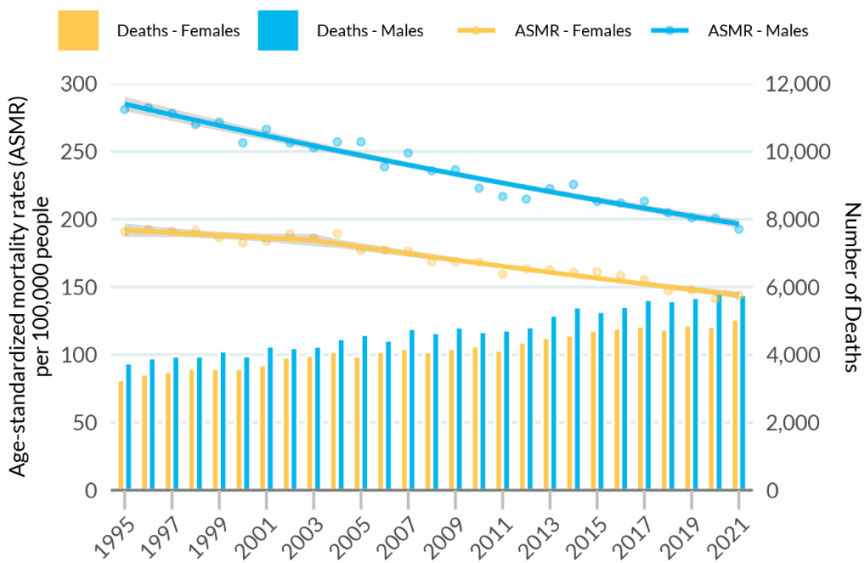
Note: Standardized to 2011 Canadian Standard Population (Statistics Canada 2011 census)

Figure 2-2 All cancer incidence trend



Note: The shaded grey area represents the 95% confidence interval for the data.

Figure 2-3 All cancer mortality trend



Note: The shaded grey area represents the 95% confidence interval for the data.

Table 2-4 Cancer deaths (mortality) by cancer type and sex 2021

Cancer type	Deaths (F)	Deaths (M)
All Other Cancers	635	710
Body of Uterus	190	
Brain	140	205
Breast	690	10
Cervix	55	
Colorectal	560	615
Esophagus	75	280
Head and Neck	75	200
Hodgkin Lymphoma	5	10
Kidney	70	155
Leukemia	150	220
Liver	65	175
Lung	1,120	1,160
Melanoma (Skin)	60	95
Multiple Myeloma	105	130
Non-Hodgkin Lymphoma	160	220
Ovary	265	
Pancreas	405	470
Prostate		705
Stomach	95	140
Testis		5
Thyroid	30	15

Figure 2-4 Cancer deaths by cancer type 2021

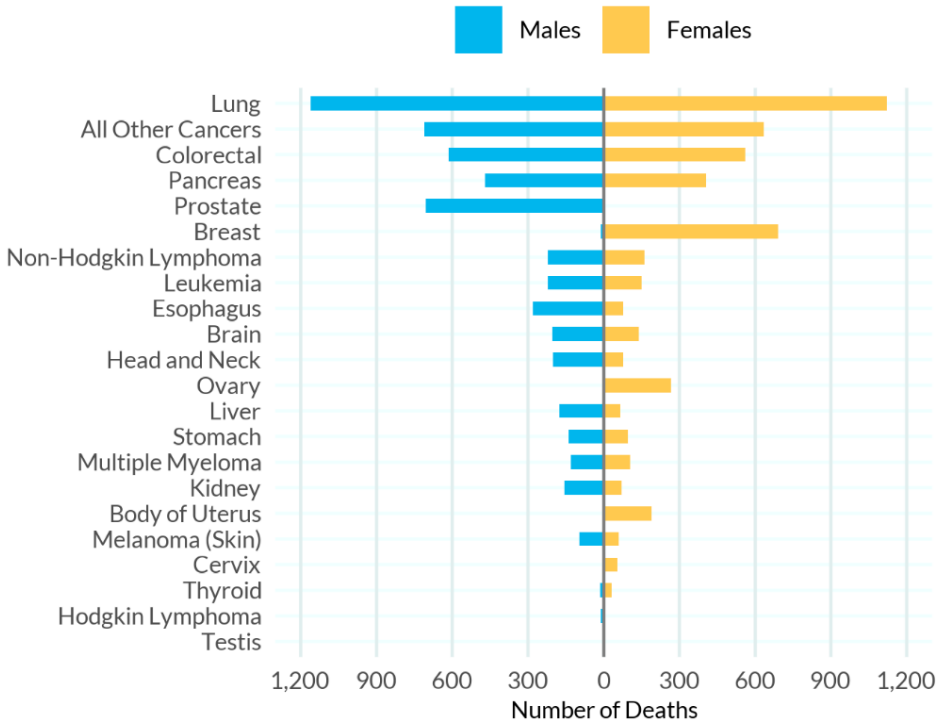
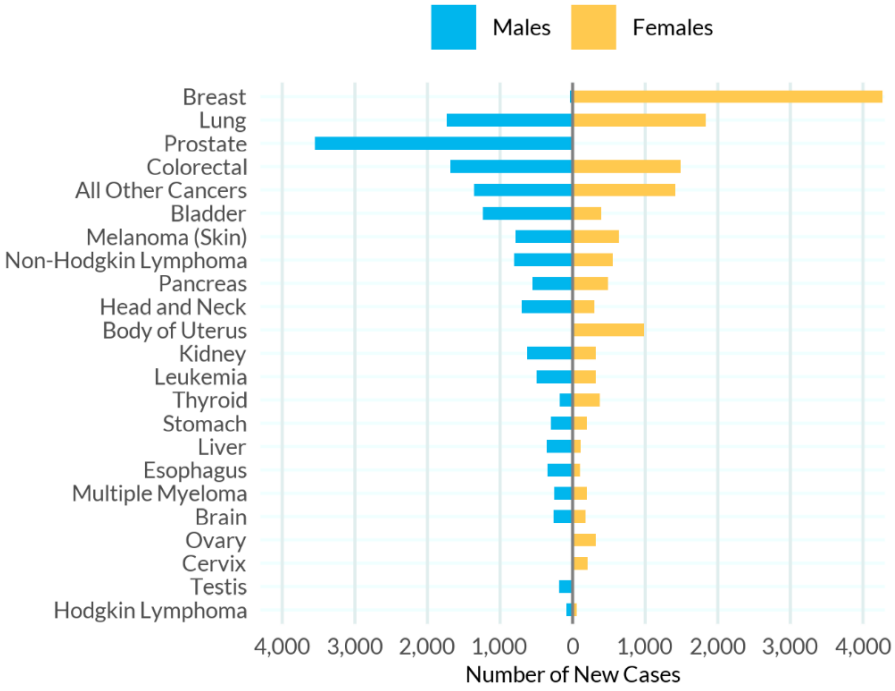


Table 2-5 New cancer cases (incidence) by cancer type and sex 2021

Cancer type	Cases (F)	Cases (M)
All Other Cancers	1,410	1,360
Bladder	390	1,240
Body of Uterus	985	
Brain	175	260
Breast	4,270	40
Cervix	205	
Colorectal	1,485	1,685
Esophagus	105	345
Head and Neck	295	700
Hodgkin Lymphoma	55	80
Kidney	320	625
Leukemia	315	495
Liver	115	360
Lung	1,840	1,735
Melanoma (Skin)	635	790
Multiple Myeloma	195	250
Non-Hodgkin Lymphoma	550	805
Ovary	320	
Pancreas	490	550
Prostate		3,545
Stomach	195	300
Testis		185
Thyroid	370	180

Figure 2-5 New cancer cases by cancer type and sex 2021



Survival

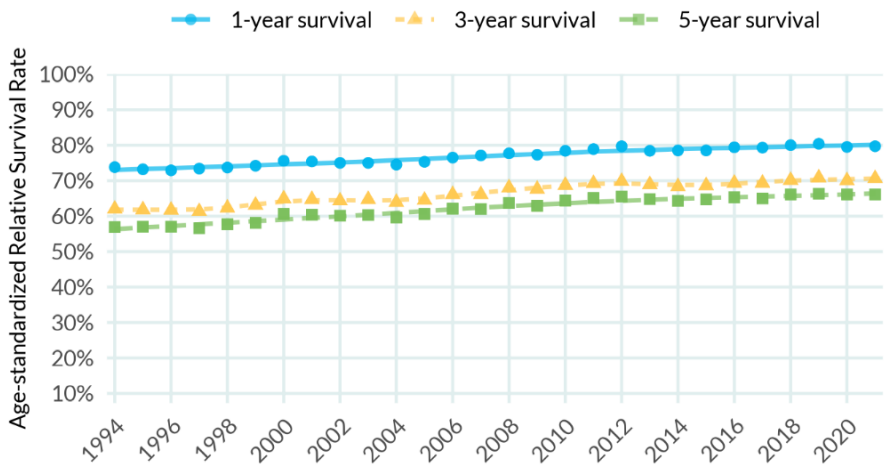
- Relative survival compares survival rates in those with cancer to those without cancer. It is also referred to as net survival.
- All cancer age-standardized relative survival rates have increased over the years.
- Data from 2021 reveals that on average, individuals with cancer were 80% as likely to survive the first year after diagnosis relative to the general age-standardized population (compared to 73% in the late 1990s). Individuals were 66% as likely to survive the first five years after diagnosis relative to the general age-standardized population (compared to 57% in the late 1990s).
- Across Canada (excluding Quebec), the predicted five-year survival index for B.C. was the third highest at 62.5%, following Ontario and Alberta. Similar to B.C., the predicted five-year survival rates have improved for each province, with the largest increases seen in Alberta and Ontario. Lung and bronchus, breast, colon and non-Hodgkin lymphoma were the main contributors to positive changes in the predicted five-year survival rate in B.C. over time.[5]

Table 2-6 All cancer survival rate 2021

Year	Survival time	Age-standardized relative survival rate (%)
2021	1-year	79.7
2021	3-year	70.6
2021	5-year	66.1

Note: Standardized to International Cancer Survival Standard (ICSS) Population weights (Corazziari, I, Quinn, M, and Capocaccia, R. Standard cancer patient population for age standardising survival ratios. European Journal of Cancer 40.15 (2004): 2307-2316)

Figure 2-6 All cancer survival trend



Additional Indicators

Cancer patients screened for tobacco use

- Smoking cessation, even after a cancer diagnosis, improves the effectiveness of cancer treatment and patient quality of life while simultaneously reducing costs to the healthcare system.
- B.C., along with other Canadian provinces and territories, has invested in integrating smoking cessation efforts into its ambulatory cancer care services.[6]
- All new ambulatory care cancer patients between September 2019 and December 2021 were screened for tobacco use.
- Over the COVID-19 time period, all six cancer centres in B.C. offered smoking cessation support to cancer patients and their families. Each cancer centre also offered culturally competent smoking cessation support for Indigenous cancer patients and their families.
- The Canadian Partnership Against Cancer designated B.C. with an overall "Gold" ranking in 2022/23, assessing high quality ("Gold") in five of six dimensions of smoking cessation program support (behavioural counselling, pharmacotherapy, person-centredness, partnership, and indicator measurement and reporting). The dimension "Culturally competent" was ranked as "Silver".[7]
- Given the importance and success of this program to date, screening and smoking cessation support for ambulatory care cancer patients will continue to be offered across B.C.

Attachment to primary care practitioner or group practice

- Primary care providers (e.g., family physicians and nurse practitioners) are often the first point of contact for patients experiencing symptoms that may lead to a diagnosis of cancer. Patients with primary care providers are also more likely to access appropriate screening services. For both reasons, attachment to a primary care provider can lead to earlier diagnosis of cancer.
- This indicator shows the percentage of cancer patients diagnosed each year who were attached to a primary care provider or group practice in the year prior to diagnosis. Patient "attachment" has been calculated using an algorithm analyzing patient visit patterns to the same solo or group practice.
- Adults 17 years and older experienced attachment rates ranging from 89-91% between 2016 and 2021.
- The high rate of attachment for adults is driven by those 65 years and older (93-94% between 2016 and 2021, data not shown), as older persons are more frequently likely to visit healthcare providers due to their increasing comorbidities and complexities.
- An analysis of the 2020 Commonwealth survey showed that Canada experienced an attachment rate of 90.5%, with 83% reporting a primary care provider and an additional 8% reporting a regular place of care (e.g., a walk-in clinic).[8] B.C.'s rate in 2020 (91%) is similar to this reported Canadian average.
- In numerous jurisdictions, such as UK, Norway, Netherlands and Finland, more than 95% of the population has a regular primary care clinician or place of care.[8]
- With 17% of the B.C. population without a regular primary care provider, room for improvement exists.
- In July 2023, the B.C. Ministry of Health and its partners, Doctors of BC and Nurses and Nurse Practitioners of BC, launched the Provincial Attachment System as part of the Ministry's Primary Care Strategy. Its goal is to increase the attachment rate by streamlining the process for connecting patients without a primary care provider with a provider who can take on new patients.[9] This includes asking family physicians and nurse practitioners to create 'patient panels' (i.e. a list of patients to whom they are responsible for providing primary care services) from their EMR systems and upload these panels to the MoH's Health Connect Registry. This Registry will enable unattached B.C. residents to be matched with a provider with capacity to take on new patients.
- Through the panel data, it will become possible to more accurately calculate the provincial PCP attachment rate by using patient lists generated from individual EMR systems expressly for this purpose, rather than assessing patient visit patterns from administrative data.

Table 2-7 Patients diagnosed with cancer, who were attached to a primary care practitioner or group practice one-year prior to diagnosis

Year of Diagnosis	Percent 17 Years and Older (%)
2016	89.9
2017	89.7
2018	89.4
2019	89.6
2020	89.9
2021	90.9

Notes: A patient is considered attached if the majority of their visits in the last year (≥ 3 visits) or in last ten years (at least 3 of the 5 visits) were made to the same solo or group practice.

Patients who have at least 5 visits but do not have a majority with a solo or group practice are categorized not attached.

Patients who have fewer than 5 visits, and do not have 3 to the same solo or group practice, have unknown attachment.

Emergency hospital admission 30 days leading up to cancer diagnosis

- This indicator measures the annual percentage of cancer patients diagnosed within 30 days after an emergency hospital admission for selected cancers (diseases of the colon, liver, lung, esophageal, ovary, pancreas, rectal and stomach).
- Research has shown that this diagnostic pathway may be associated with poorer survival and patient-reported outcomes, even after adjusting for stage at diagnosis, possibly due to delayed action on the patient's part to seek help or due to long waits for testing and care.[10]
- Between 2016 and 2021, rates remained stable with 29-31% of diagnosed B.C. cancer cases experiencing an emergency hospital admission in the 30 days leading up to the cancer diagnosis.
- Published data[10] from previous years (2012-2017) shows a similar percentage for B.C. (31%) and Alberta (30%), and a lower percentage for Ontario (26%), Atlantic Canada (27%) and Saskatchewan-Manitoba (28%). Canadian rates, however, were found to be lower than those in other jurisdictions studied (Norway 37%, Scotland 39%, Wales 37% and New Zealand 43%).
- The reasons behind emergency hospital admissions within 30 days of a cancer diagnosis are varied and complex. Improved screening and primary care provider attachment rates could potentially decrease B.C.'s emergency hospital admission rates and lead to improved patient outcomes, although it is not known to what extent.

Table 2-8 Emergency hospital admission 30 days leading up to diagnosis with one of the 8 cancer types

Year	Patients who were diagnosed with cancer	Emergency hospital admission (N)	Emergency hospital admission (%)
2016	8,978	2,698	30.1
2017	9,012	2,687	29.8
2018	9,037	2,664	29.5
2019	9,574	2,780	29.0
2020	8,870	2,678	30.2
2021	9,639	2,984	31.0

Note: 8 Cancer types include: colon, liver, lung, esophageal, ovary, pancreas, rectal and stomach

Chapter End Notes

[1] Canadian Cancer Society. Canadian Cancer Statistics 2023 [Internet]. Toronto, ON: Canadian Cancer Society; 2023 p. 11. Available from: cancer.ca/Canadian-Cancer-Statistics-2023-EN

[2] Canadian Cancer Society. Canadian Cancer Statistics 2023 [Internet]. Toronto, ON: Canadian Cancer Society; 2023 p. 29. Available from: cancer.ca/Canadian-Cancer-Statistics-2023-EN

[3] Canadian Cancer Society. Canadian Cancer Statistics 2023 [Internet]. Toronto, ON: Canadian Cancer Society; 2023 p. 53. Available from: cancer.ca/Canadian-Cancer-Statistics-2023-EN

[4] Government of British Columbia. CancerPlan2023 [Internet]. Victoria, BC: Government of British Columbia; [cited 2023 Jun 28]. Available from: https://www.gov.bc.ca/CancerPlan2023.pdf. p. 5.

[5] Ellison LF. Measuring progress in cancer survival across Canadian provinces: Extending the cancer survival index to further evaluate cancer control efforts. Health Reports. 2022; 33(6):17-29.

[6] Smoking cessation in cancer care across Canada, 2022-23 [Internet]. Canadian Partnership Against Cancer. Available from: https://www.partnershipagainstcancer.ca/topics/smoking-cessation-cancer-care-2022-2023/

[7] British Columbia [Internet]. Canadian Partnership Against Cancer. [cited 2024 Jun 21]. Available from: https://www.partnershipagainstcancer.ca/topics/smoking-cessation-cancer-care-2022-2023/british-columbia/

[8] Shahaed H, Glazier RH, Anderson M, Barbazza E, Bos VL, Saunes IS, Auvinen J, Daneshvarfard M, Kiran T. Primary care for all: lessons for Canada from peer countries with high primary care attachment. CMAJ. 2023 Dec 4;195(47):E1628-36.

[9] Health M of. Provincial Attachment System - Province of British Columbia [Internet]. www2.gov.bc.ca. Available from: https://www2.gov.bc.ca/gov/content/health/provincial-attachment-system

[10] McPhail S, Swann R, Johnson SA, Barclay ME, Abd Elkader H, Alvi R, Barisic A, Bucher O, Clark GR, Creighton N, Danckert B. Risk factors and prognostic implications of diagnosis of cancer within 30 days after an emergency hospital admission (emergency presentation): an International Cancer Benchmarking Partnership (ICBP) population-based study. The Lancet Oncology. 2022 May 1;23(5):587-600.

Chapter 3: Breast Cancer

Breast Cancer Summary

Breast cancer is the most diagnosed cancer in B.C. women. Nearly 4,300 B.C. women were diagnosed with breast cancer in 2021. During this time, 720 women died from breast cancer. This accounts for the greatest potential life years lost from any medical condition for women.

Women with breast cancer were 97% as likely to survive the first year (and 91% as likely to survive the first five years) after diagnosis relative to the general age-standardized female population.

In 2021, over 44,000 women ever diagnosed with breast cancer were living in B.C., nearly triple the number (16,000 women) in 1996. This highlights the ever-increasing prevalent population of breast cancer survivors.

Areas where B.C. is performing well include:

- *Age-standardized incidence rates* - Relative to other provinces (excluding Quebec), B.C. was projected to experience the second lowest age-standardized female breast cancer incidence rate for 2023 in Canada (120.7 per 100,000 population compared to the Canadian average of 129.9 per 100,000 population).
- *Age-standardized mortality rate* - B.C. was also projected to experience the second lowest age-standardized female breast cancer mortality rate in 2023 (19.3 per 100,000 population compared to the Canadian average of 22.1 per 100,000 population).
- *The positive predictive value of screening mammograms* (~7%) has consistently exceeded Health Canada's targets (5% for first screen, 6% for subsequent screens).
- *Unplanned readmissions and emergency department visits after surgery* - Hospital readmission rates after breast cancer surgery remained constant at 2% between 2018 and 2023 and are similar to Ontario's experience. Several American studies have calculated breast cancer surgery readmission rates to be within 1-3%.
- *The breast conserving surgery (BSC) rate for T1 first primary breast cancers* reached 86% in 2023 and has been increasing over time. The European Society of Breast Cancer Specialists (EUSOMA) has a target BCS rate of 85% for invasive cancers up to 3 cm in size.

Areas with room for improvement include:

- *Breast screening wait time to diagnosis with tissue biopsy* - In 2022, 52.4% of screening participants who had an abnormal mammogram result and needed a tissue biopsy for a definitive diagnosis were diagnosed within 7 weeks compared to 63% in 2019. The national target is 90%. Continued efforts to work with health authorities are underway to streamline processes and improve wait times.
- *The median time from diagnosis to first treatment* - Values ranged from 38-42 days between 2018-2021 for patients diagnosed with stage 1 to 3 breast cancer. For stage 4 patients, the median treatment time ranged from 30-37 days. Although there is no agreed upon specific target for B.C. (or other provinces in Canada) and differences in methods and definitions make jurisdictional comparisons challenging, there is general agreement that there is room for improvement.
- *The rates of neoadjuvant chemotherapy prescribed for triple negative and HER2-positive stage 2-3 breast cancer* - In 2021, the rate of both neoadjuvant and adjuvant chemotherapy for stage 1 (T1C) triple negative breast cancers was 75%, and for Stage 2-3 cancers was 81.7%. The rate of both neoadjuvant and adjuvant chemotherapy (+/- targeted therapy) in stage 1 (T1C)

HER2-positive breast cancers was 93.5%, and for Stage 2-3 cancers was 91.9%. Continued room for knowledge transfer, and hence, improvement, exists.

This chapter also presents the following indicators, for which no assessment of performance has been made:

- Relative Survival Rates
- Breast screening participation rate
- Stage at Diagnosis
- Unplanned emergency department visits within 30 days of discharge from hospital post-surgery
- Adjuvant radiation after mastectomy in patients with lymph node involvement

Data Sources

The main data source used in this section was the BC Cancer Registry, which at the time of this analysis included all cases of cancer among BC residents to the end of 2021. Indicators in this section are supported by linkage of the BC Cancer Registry to other health services data including the Surgical Patient Registry, the BC Cancer Pharmacy and Radiotherapy databases, the Discharge Abstract Database, and CASCADE screening information system. At the time of analysis these additional data sources typically had health service follow-up data available to the end of 2023. More details on data sources can be found in the accompanying technical appendix for this report.

Breast Cancer Burden

Incidence, mortality and prevalence

- Breast cancer is currently the most commonly diagnosed cancer in the world.[1]
- The incidence of breast cancer has been rising globally, not just in B.C.,[2] in part due to population growth and aging.[3] Research suggests that these increases could also at least partially be due to potentially modifiable risk factors such as obesity, alcohol consumption and older ages for first births.[2]
- Breast cancer is the most commonly diagnosed cancer in B.C. women.[4]
- Nearly 4,300 women were diagnosed with breast cancer in B.C. during 2021. Age-standardized incidence rates of breast cancer in females have been increasing in B.C. over time, with a brief period of decline from 1998 to 2003, and have continued to rise steadily since then, reaching a rate of 137 per 100,000 population in 2021.
- While the number of breast cancer deaths has slightly risen over time, breast cancer mortality rates have steadily declined. In 2021, 720 women died from breast cancer. The age-standardized mortality rate for breast cancer was 20.5 per 100,000 population in 2021, down from 34.0 per 100,000 in 1995.
- As a result, the prevalence of women living in B.C. ever diagnosed with breast cancer has increased. In 2021, over 44,000 women ever diagnosed with breast cancer were living in B.C., nearly triple the number (16,000 women) in 1996.
- In 2022, 62% of these women had been diagnosed more than five years previously, compared to 42% of women in 1996.
- Relative to other provinces (excluding Quebec), B.C. experienced the second lowest projected age-standardized female breast cancer incidence rate for 2023 (120.7 per 100,000 population). Only New Brunswick was lower at 116.8 per 100,000 population. The Canadian average was 129.9 per 100,000 population.[5]
- It has been suggested that the brief decline in breast cancer incidence rates around the year 2000 was likely due in part to a decline in the use of hormone-replacement therapy (HRT) in post-menopausal women due to emerging evidence of increased risk of breast cancer with longer use of HRT.[6]
- Relative to other provinces (excluding Quebec), B.C. was also projected to experience the second lowest age-standardized female breast cancer mortality rate in 2023 (19.3 per 100,000 population). Only P.E.I. was lower at 18.1 per 100,000 population. The Canadian average was 22.1 per 100,000 population.[5]
- The decreasing mortality rates of breast cancer patients are attributed to the positive impacts of earlier detection and to advances in the treatment (both systemic and locoregional) of breast cancers.[7]

Table 3-1 Breast cancer prevalence 2021

Year	Limited duration (years)	Prevalence count
2021	0 to 1	3,549
2021	>1 to 5	13,254
2021	>5 to 10	12,449
2021	>10 to 20	14,997

Notes: Prevalence reported as of January 1, 2022.

Limited duration (years) refers to the time since a cancer diagnosis, categorized to show the prevalence of cancer by years since diagnosis.

Table 3-2 Breast cancer incidence 2021

Year	Incidence count	Age-std incidence rate (per 100,000)
2021	4,285	137.1

Note: Standardized to 2011 Canadian Standard Population (Statistics Canada 2011 census)

Figure 3-1 Breast cancer prevalence trend

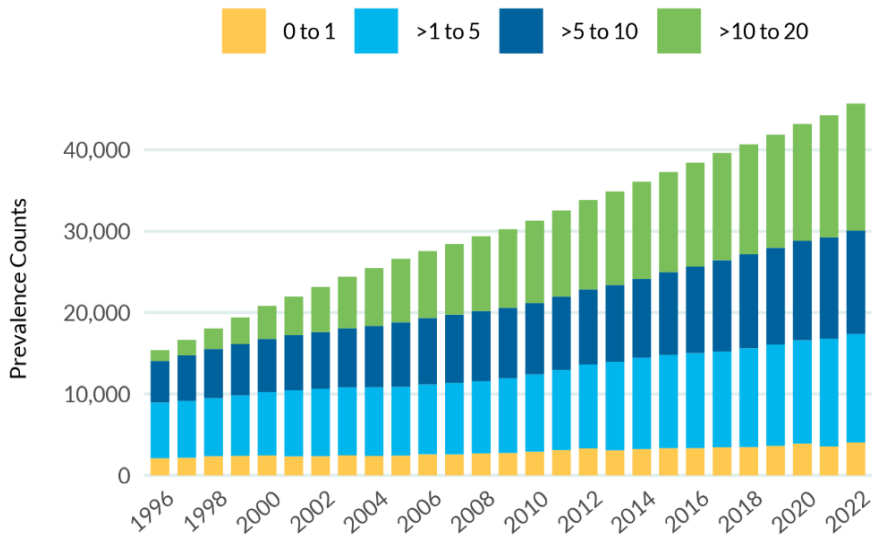
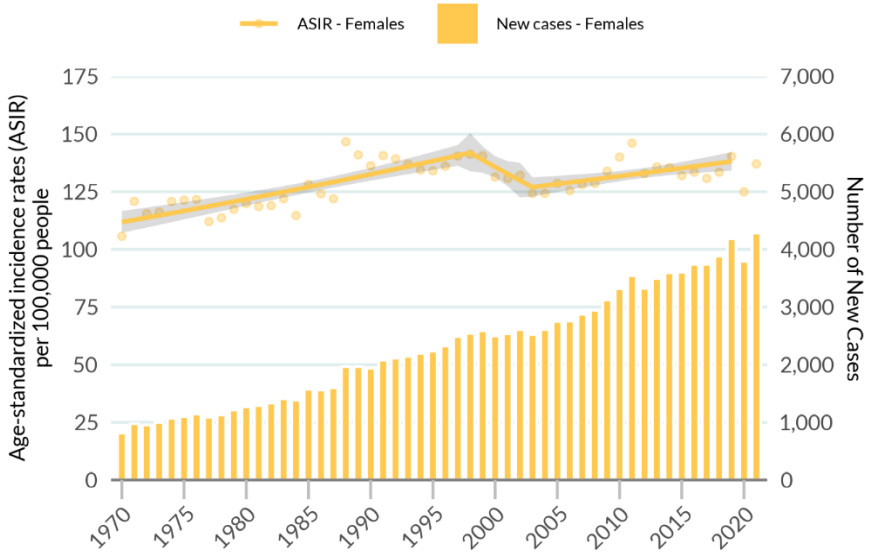


Figure 3-2 Breast cancer incidence trend



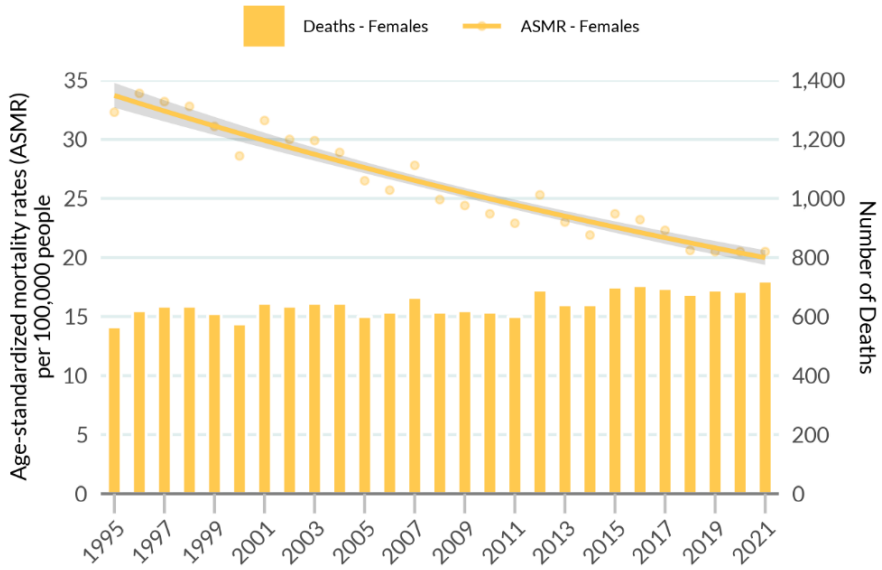
Note: The shaded grey area represents the 95% confidence interval for the data

Table 3-3 Breast cancer mortality 2021

Year	Mortality count	Age-std mortality rate (per 100,000)
2021	720	20.5

Note: Standardized to 2011 Canadian Standard Population (Statistics Canada 2011 census)

Figure 3-3 Breast cancer mortality trend



Note: The shaded grey area represents the 95% confidence interval for the data

Survival

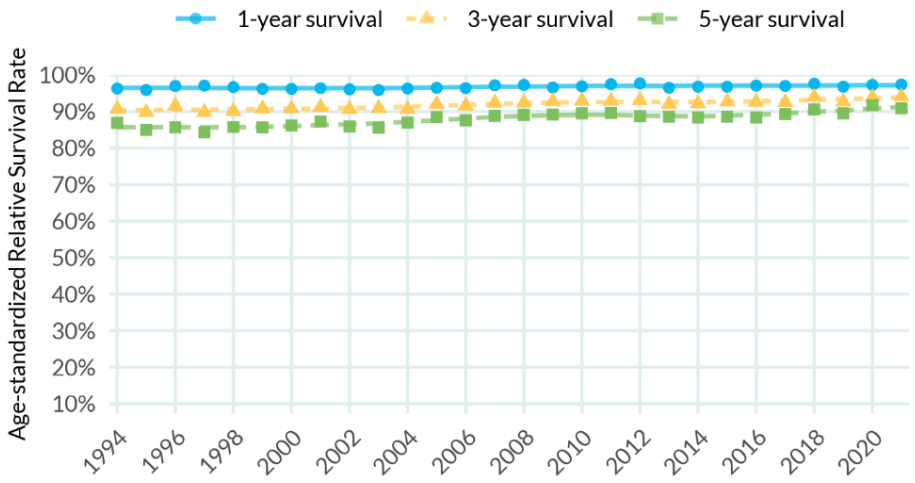
- Relative survival compares survival rates in women with breast cancer with those without breast cancer and is also referred to as net survival.
- This indicator provides a measure of cancer's impact on survival in our population.
- Relative survival rates for breast cancer remain high. Data from 2021 reveals that on average, women with breast cancer were 97% as likely to survive the first year after diagnosis relative to the general age-standardized female population (those without breast cancer). Women were 91% as likely to survive the first five years after diagnosis relative to the general age-standardized female population.
- The one-year age-standardized relative survival rate for breast cancer has remained close to 97% since the 1990s. The five-year age-standardized relative survival rate has increased to 91% in 2021, up from 87% in 1994.
- According to Canadian Cancer Statistics, the predicted 5-year age-standardized net survival rates from 2015-2017 for female breast cancer were similar across Canadian provinces (excluding Quebec) and ranged from 88-90%.[8]
- Relative survival rates for female breast cancer in B.C. are similar to the Canadian experience and have been improving over time.[9]
- More than 44,000 breast cancer patients and survivors were living in B.C. as of January 1, 2022. This is important to know as cancer survivors require ongoing care, follow up and support. This type of data assists health planners with resource and business planning.
- Breast cancer survival outcomes are strong in B.C. and comparable to other Canadian jurisdictions. Continued efforts to benchmark outcomes with other high quality cancer systems will be made to ensure B.C.'s outcomes remain strong.

Table 3-4 Breast cancer survival 2021

Year	Survival time	Age-standardized relative survival rate (%)
2021	1-year	97.4
2021	3-year	94.1
2021	5-year	90.9

Note: Standardized to 2011 Canadian Standard Population (Statistics Canada 2011 census)

Figure 3-4 Breast cancer survival trend



Pre-Diagnosis and Screening

Breast screening participation rate

- A higher participation rate in breast screening correlates with decreased mortality from breast cancer.
- This indicator measures the percentage of women aged 50-69 years that were screened via mammography within the recommended screening interval of 24 months plus six months (30 months total).
- Participation decreased to 45% during the COVID-19 pandemic and is recovering slowly, in part due to human health resource capacity issues. Participation in 2023 reached 48%.
- Data does not include breast imaging performed outside the breast screening program (opportunistic screening). Therefore, a total screening participation rate cannot be calculated. CPAC has recommended a screening target of 70%.[10]
- To support participation, the Breast Screening Program: employs a health promotions team to encourage population screening; collaborates with Health Authority partners to provide support where possible; and is developing an initiative to send invitations to patients who have never been screened.
- Continued recovery is expected as health human resources improve. Ongoing initiatives to improve staff recruitment and retention are also being supported by the 10-year Cancer Plan.

Table 3-5 Breast screening participation rate for age group 50-69

Year	Eligible population (N)	Participants (N)	Participation rate (%)
2019	690,238	343,653	49.8
2020	697,122	316,216	45.4
2021	702,396	316,343	45.0
2022	704,990	333,494	47.3
2023	704,411	337,633	47.9

Note: For the Year, the 30-month reporting period ends on Dec 31.

Positive predictive value of screening mammograms

- The positive predictive value (PPV) is the likelihood an abnormal screening test represents cancer. The PPV goes up with increased prevalence of cancer in the population.
- In younger age groups the prevalence of cancer is lower, so the PPV is decreased for this group.
- The Health Canada target (50-69) for first screen is >=5% and for subsequent screens is >= 6%. PPV values for the 50-74 age group in B.C. are higher, ranging from 7.4-8.4% between 2018 and 2022.
- The program PPV is within target and the consistently high PPV is encouraging indicating high-quality imaging and mammography reads by radiologists in the Screening Mammography Program of British Columbia (SMPBC).

Table 3-6 Positive predictive value of screening mammograms

Year	Age group	Abnormal screens (N)	Diagnosed breast cancers after abnormal screen (N)	PPV (%)
2018	50-69	14,601	962	6.6
	50-74	16,936	1,244	7.4
2019	50-69	14,265	1,027	7.2
	50-74	16,642	1,317	7.9
2020	50-69	9,713	666	6.9
	50-74	11,563	884	7.7
2021	50-69	13,824	1,023	7.4
	50-74	16,231	1,358	8.4
2022	50-69	12,440	929	7.5
	50-74	14,564	1,171	8.0

Notes: Breast cancers are Ductal Carcinoma in Situ (DCIS) and Invasive.

Two age group definitions are presented. The classification ”50-69 years” aligns to the national target; and ”50-74” years aligns with the Ontario definition. A higher PPV is desirable as it is indicative of a lower number of false positive tests in the screening population.

Breast screening wait time to diagnosis with tissue biopsy

- As per the national target, 90% of Breast Screening participants should receive resolution of an abnormal screen within 7 weeks for those requiring a biopsy.[11]
- In 2022, 52.4% of 3,481 screening participants who had an abnormal mammogram result and needed a tissue biopsy for a definitive diagnosis were diagnosed within the 7 week target, compared to 63% in 2019.
- This rate has decreased from pre-pandemic years mainly due to HR capacity challenges across the province. Regular "Fast Track Summary"[5] reports are shared with health authorities. Quarterly meetings are held with health authority partners who are responsible for delivering care, to support and collaborate on solutions for reducing wait time to diagnosis.
- There is an opportunity to work with health authorities to support and improve timely diagnostic services.

Table 3-7 Breast cancer screening program wait time to diagnosis with tissue biopsy

Year	Abnormal screen with tissue biopsy (N)	Diagnosed within 7 weeks of abnormal screen (N)	Diagnosed within 7 weeks of abnormal screen (%)
2019	3,606	2,257	62.6
2020	2,461	1,679	68.2
2021	3,703	2,126	57.4
2022	3,481	1,825	52.4

Note: Includes all ages.

[5] Fast Track is the process by which the Breast Screening program facilitates follow-up referrals on behalf of providers.

Diagnosis

Stage at diagnosis

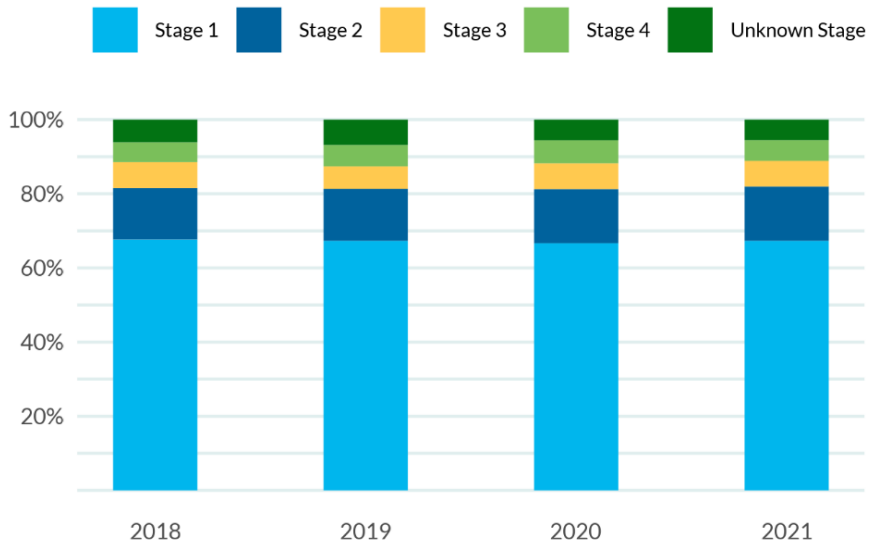
- The stage presentation of breast cancer is one of the most important factors in the prognosis (outcome) for the individual and in determination of types of treatment (surgery, radiation and/or drug treatment) to be considered.
- Primary screening (such as organized by the B.C. Breast Cancer Screening Program) is intended to detect breast cancers at an earlier stage. The proportional distribution of lower stage breast cancers is a key indicator of the impact of primary screening programs on the overall population.
- Approximately two-thirds (67%) of newly diagnosed breast cancers are stage 1 in B.C., and this proportion has been constant over the past few years.
- A 5.6% incidence of stage 4 breast cancers (which are considered incurable) is similar to the rate in Canada (excluding Quebec) 4.9%[12] and in other countries with organized screening programs. Australia's Stage 4 diagnosis rate in 2011 was 4.6%.[13]
- The overall stage distribution of breast cancers diagnosed in B.C. is similar to other provinces in Canada and supports screening mammography and breast awareness as key factors for a lower stage presentation and better outcome overall in B.C.
- The relative stability of high stage 1 and low stage 4 presentations even during the beginning of the COVID epidemic years (2020-2021) support the immense work of the SMPBC undertaken during the beginning of the pandemic.
- Ongoing work by the SMPBC to enhance participation and integrate new screening technologies in the future will be key to further improve the stage presentation of breast cancers in B.C. over time.

Table 3-8 Breast Cancer Stage at Diagnosis

Year	Stage 1 %	Stage 2 %	Stage 3 %	Stage 4 %	Unknown %
2018	67.7	13.9	7.0	5.4	6.1
2019	67.3	14.0	6.0	5.8	6.8
2020	66.7	14.6	7.0	6.2	5.6
2021	67.3	14.6	6.9	5.6	5.5

Note: Unknown stage cases may arise when patients do not undergo the full diagnostic workup required to determine stage, or when the record of the workup is not complete.

Figure 3-5 Breast Cancer Stage at Diagnosis



Time from diagnosis to first treatment

- The time from diagnosis to first treatment is considered an important key indicator to both patients and to the health care system. Many factors can impact this metric including primary care provider access, patient preference, appropriate breast cancer specialist access, availability of surgical operating room time, or new systemic treatment start access.
- Although there is currently no consensus on impact of time to treatment, some studies have shown that survival is improved by decreasing time from diagnosis to surgery[14] or surgery to chemotherapy.[15]
- For patients with stage 1 – 3 breast cancer, the median time from diagnosis to first treatment ranged from 38 to 42 days over the period of 2018 to 2021.
- Time from diagnosis to treatment start for stage 4 breast cancer patients was slightly shorter with a median time ranged from 30-37 days. This may be due to their more acute symptomatic presentation and the need to prevent further patient deterioration as compared to the generally more well patients with stage 1-3 disease.
- The overall range and times from first diagnosis to treatment has been relatively stable – including during the challenging times of the early COVID pandemic years of 2020-2021.
- EUSOMA has recommended that 90% are treated within 6 weeks of first diagnostic testing[16] and in the UK the recommended time from decision to treat to first treatment is 31 days.[17] The median treatment interval (diagnosis to receipt of definitive therapy) in a U.S. study was 32 days for the period 2004 to 2015.[18] Although there are no Canadian benchmarks for this indicator Cancer Care Manitoba has recommended 60 days from suspicion of cancer to first treatment with time from diagnosis to first treatment of 30 days.[19] The mean time from diagnosis to treatment in Ontario in 2018 was 35 days.[20]
- Overall B.C.'s performance in the time from diagnosis to first treatment is in the same general range as in provinces in Canada and to that demonstrated in a U.S. study.
- Although there is no agreed upon specific target for B.C. (or other provinces in Canada) and differences in methods and definitions make jurisdictional comparisons challenging, there is general agreement that for this indicator, there is room for improvement.

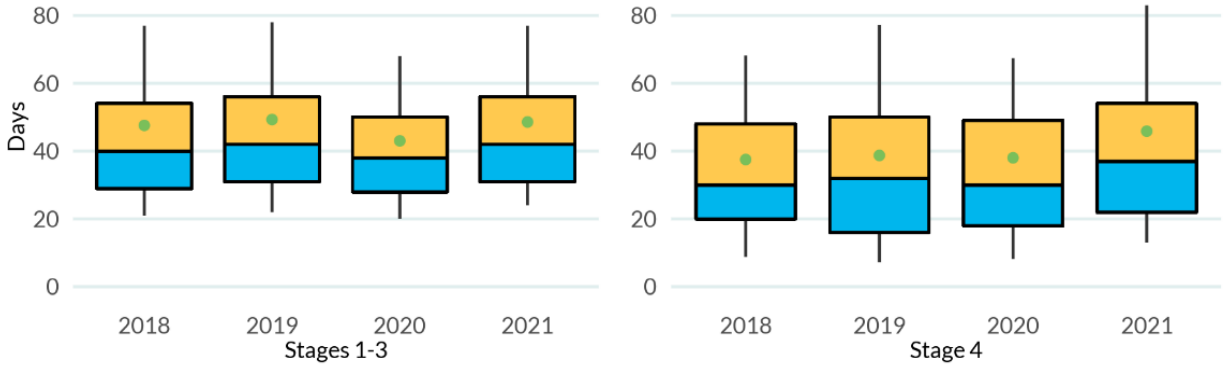
Table 3-9 Time from diagnosis to first treatment in days

Year	Stage	Number of patients (N)	Mean	P10	P25	P50	P75	P90
2018	All Patients	3,534	47.96	21	28	39	55	78
2019	All Patients	3,805	49.58	21	30	41	56	80
2020	All Patients	3,513	43.60	20	28	37	50	69
2021	All Patients	4,002	48.64	23	31	42	56	78
2018	Stage 1-3	3,191	47.58	21	29	40	54	77
2019	Stage 1-3	3,389	49.31	22	31	42	56	78
2020	Stage 1-3	3,130	43.02	20	28	38	50	68
2021	Stage 1-3	3,598	48.59	24	31	42	56	77
2018	Stage 4	169	37.51	8	20	30	48	69
2019	Stage 4	193	38.72	7	16	32	50	78
2020	Stage 4	193	38.01	8	18	30	49	68
2021	Stage 4	201	45.87	13	22	37	54	83

Notes: The overall results for all patients includes cases with stage 0 and unknown stage.

Treatments include systemic therapy (Chemotherapy, targeted therapy, hormonal therapy), radiation treatment, and surgery.

Figure 3-6 Time from diagnosis to first treatment for Breast Cancer



Note: Range is the 10th to 90th percentiles.

Treatment

Unplanned emergency department visits and hospital readmission rates within 30 days of discharge from hospital post-surgery

- Unplanned Emergency Department (ED) visits and hospital readmissions post-surgery are associated with increased patient risk, patient discontent and increased resource utilization. Common reasons for revisiting the hospital within 30 days of breast cancer surgery include pain, wound/implant complications and care for surgical follow-up.[21] While some of these visits may be unavoidable, others may be preventable.
- The rates of unplanned ED visits and hospital readmissions after breast cancer surgery are low relative to other disease sites such as colorectal, lung, prostate and cervical cancers.
- Hospital readmission rates after breast cancer surgery remained constant at 2% between 2018 and 2023, while unplanned ED visits decreased from 11% to 9%. It is unknown the extent of this decrease that may be attributed to COVID-19-related disruptions.
- In 2018, post-surgery readmission rates were similar between Ontario[20] and B.C. (2%).
- Several American studies have calculated breast cancer surgery readmission rates to be within 1-3%.[22,21]
- During this same time, Ontario experienced an unplanned ED visit rate of 13%,[20] compared to B.C.'s 11%. It is not known whether this difference is statistically significant.
- An American study calculated that 3.1% of mastectomy cases experienced an unplanned ED visit within 30 days of surgery.[21] It is not known to what extent these differences can be attributed to variations in system resources, care patterns, patient characteristics, or underlying data differences.

Table 3-10 Unplanned emergency department visits or readmissions within 30 days of discharge from hospital post-surgery

Year	Patients who had surgeries (N)	Unplanned emergency department visits (%)	Readmissions (%)
2018	3,864	11.4%	2.1
2019	3,611	11.2%	2.0
2020	3,455	9.5%	2.0
2021	3,982	10.1%	1.8
2022	3,979	9.3%	1.7
2023	3,598	9.4%	1.7

Breast conserving surgery rate for T1 first primary breast cancers

- Breast conserving surgery (BCS) and radiation has been shown to have at least an equivalent probability of survival compared to mastectomy but with fewer surgical complications.[23,24,25] Modern radiation techniques and treatment schedules have made radiation treatment more accessible to patients, thereby increasing the number of patients for whom BCS is feasible.
- T1 tumors (up to 2 cm) were selected for indicator population as BCS is feasible for the majority of women at this tumor size.
- BCS rates for T1 tumors increased from 78% to 86% from 2019-2023.
- EUSOMA has a target BCS rate of 85% for invasive cancers up to 3 cm in size.[26]
- Previous Canadian reports showed that B.C. had a BCS rate for all sizes of tumor of 65%, slightly below the pan-Canadian average.[27]
- The rate of BCS for T1 tumors has been increasing in B.C. This is in line with recommendations from other jurisdictions.

Table 3-11 Breast conserving surgery rate for T1 first primary breast cancers

Year	Volume	BCS count (N)	BC rate (%)	BCS rate lower limit (%)	BCS rate upper limit (%)
2019	1,032	802	77.7	75.0	80.2
2020	989	780	78.9	76.2	81.4
2021	1,162	952	81.9	79.6	84.1
2022	1,190	985	82.8	80.5	84.9
2023	1,065	911	85.8	83.3	87.6

Notes: Data only available for patients with a synoptic pathology report.

The lower and upper limit (%) columns represent the 95% binomial confidence interval for the breast conserving surgery rate.

Adjuvant radiation after mastectomy in patients with lymph node involvement

- Adjuvant radiotherapy after mastectomy for patients with lymph node positive breast cancer has been shown to improve locoregional control and decrease breast cancer mortality.[28,29]
- In 2021 in B.C., 79% of patients with nodal stage N1 and greater received adjuvant radiotherapy after mastectomy.
- This rate has remained fairly stable since 2018.
- B.C. (nor do other Canadian provinces) does not currently have a target for this indicator. Improved breast cancer outcomes after adjuvant radiotherapy in the lymph node positive setting has been attributed to comprehensive regional nodal irradiation.[28,30]
- International guidelines support the use of adjuvant radiotherapy post mastectomy for lymph node positive patients.[31,32,33]
- Some lymph node positive patients with lower risk features may have less benefit from adjuvant radiotherapy; omission of radiotherapy for these patients is currently under investigation within clinical trials.[34]
- For now, adjuvant radiotherapy remains standard of care for patients with lymph node positive disease.

Table 3-12 Adjuvant radiation after mastectomy in patients with lymph node involvement

Year	Mastectomies with nodal stage >= N1 (N)	Mastectomies with nodal stage >= N1 followed by adjuvant radiation (N)	Adjuvant radiation rate (%)
2018	695	549	79.0
2019	688	548	79.7
2020	615	513	83.4
2021	745	588	78.9

Note: Excludes stage 4

Figure 3-7 Adjuvant radiation after mastectomy in patients with lymph node involvement by year

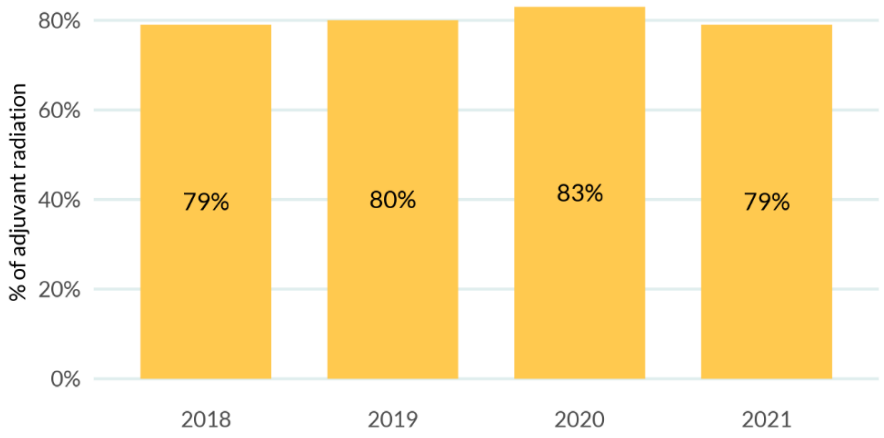
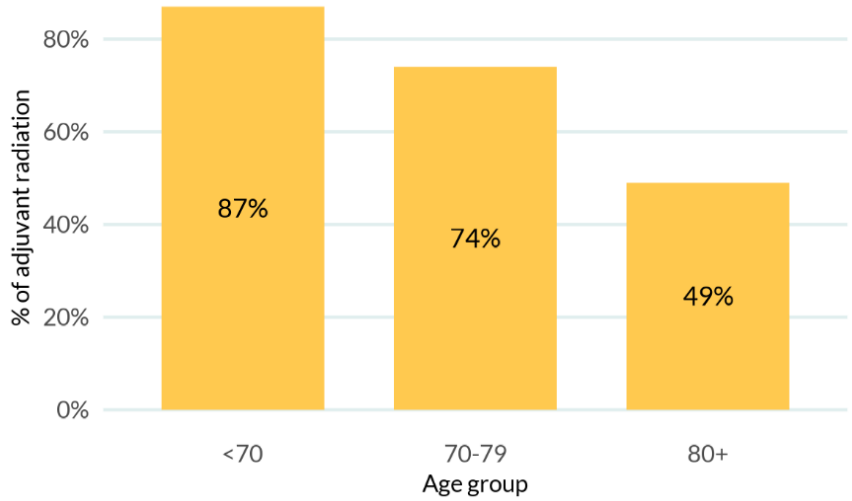


Figure 3-8 Adjuvant radiation after mastectomy in patients with lymph node involvement by age group



Stage 1(T1C) to 3, triple negative or HER2-positive patients who received neoadjuvant/adjuvant chemotherapy

- Current guidelines recommend neoadjuvant chemotherapy/targeted therapy for stage 2-3 triple negative and HER2-positive breast cancer patients.[35] In addition to improved pathologic complete response,[36] this allows for a more tailored approach to adjuvant therapy based on response to the neoadjuvant systemic treatments, which in turn has shown to improve outcomes.[37]
- Targeted treatment with trastuzumab in HER2-positive breast cancers (whether neoadjuvant and/or adjuvant) and for pembrolizumab (implemented in 2023) have demonstrated improvements in surgical (pathological complete responses) and clinical outcomes (relapse free survival and overall survival).[38,39]
- The rate of both neoadjuvant and adjuvant chemotherapy for stage 1 (T1C) triple negative breast cancers in 2021 was 75%.
- The rate of both neoadjuvant and adjuvant chemotherapy (+/- targeted therapy) in stage 2-3 triple negative breast cancers in 2021 was 81.7%.
- The rate of both neoadjuvant and adjuvant chemotherapy (+/- targeted therapy) in stage 1 (T1C) HER2-positive breast cancers in 2021 was 93.5%.
- The rate of both neoadjuvant and adjuvant neoadjuvant chemotherapy (+/- targeted therapy) in stage 2-3 for HER2-positive breast cancers in 2021 was 91.9%. It is unclear why numerically less chemotherapy positive targeted therapy was given in stage 2-3 compared to stage 1 HER2-positive breast cancer patients.
- The rates of neoadjuvant chemotherapy (+/- targeted therapy) have increased significantly in triple negative breast cancers and HER2-positive stage 2-3 breast cancers from 2018 to 2021.
- Evolving evidence is now clear that medically fit stage 2-3 triple negative and HER2-positive breast cancers should preferably receive neoadjuvant chemotherapy and targeted therapy.
- The increasing rates in B.C. from 2018-2021 supports the knowledge transfer and changing paradigm of upfront treatment from surgery to systemic treatment in this stage and subtype of breast cancers.

Table 3-13 Stage 1(T1C) to 3 triple negative patients who received neoadjuvant /adjuvant chemotherapy

Year	Stage 1 (T1C)			Stages 2-3			Combined Stages (1(T1C) - 3)		
	Patients (N)	Neoadj Chemo (%)	Adj Chemo (%)	Patients (N)	Neoadj Chemo (%)	Adj Chemo (%)	Patients (N)	Neoadj Chemo (%)	Adj Chemo (%)
2018	73	5.5	64.4	177	27.7	50.9	250	21.2	54.8
2019	73	6.9	68.5	201	37.3	48.8	274	29.2	54.0
2020	67	6.0	62.7	219	42.0	40.2	286	33.6	45.5
2021	60	10.0	65.0	213	48.4	33.3	273	39.9	40.3

Note: Patients who received both neoadjuvant and adjuvant chemotherapy are included in the neoadjuvant group.

Table 3-14 Stage 1(T1C) to 3 HER2 positive patients who received neoadjuvant /adjuvant chemotherapy

Year	Stage 1 (T1C)			Stages 2-3			Combined Stages (1(T1C) - 3)		
	Patients (N)	Neoadj Chemo (%)	Adj Chemo (%)	Patients (N)	Neoadj Chemo (%)	Adj Chemo (%)	Patients (N)	Neoadj Chemo (%)	Adj Chemo (%)
2018	94	5.3	90.4	172	35.5	54.7	266	24.8	67.3
2019	146	12.3	82.2	198	47.5	47.0	344	32.6	61.9
2020	109	6.4	84.4	207	57.0	38.2	316	39.6	54.1
2021	123	13.0	80.5	225	52.9	38.2	348	38.8	53.2

Note: Patients who received both neoadjuvant and adjuvant chemotherapy are included in the neoadjuvant group.

Chapter End Notes

[1] Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, Bray F. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2021;71(3):209-49.

[2] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023. p. 21.

[3] Xu Y, Gong M, Wang Y, Yang Y, Liu S, Zeng Q. Global trends and forecasts of breast cancer incidence and deaths. Sci Data. 2023;10(1):334.

[4] Government of British Columbia. CancerPlan2023 [Internet]. Victoria, BC: Government of British Columbia; [cited 2023 Jun 28]. Available from: https://www.gov.bc.ca/CancerPlan2023.pdf. p. 10.

[5] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023. p. 29.

[6] De P, Neutel CI, Olivotto I, Morrison H. Breast cancer incidence and hormone replacement therapy in Canada. J Natl Cancer Inst. 2010 Oct 6;102(19):1489-95. doi: 10.1093/jnci/djq345. Epub 2010 Sep 23. PMID: 20864685.

[7] Government of British Columbia. CancerPlan2023 [Internet]. Victoria, BC: Government of British Columbia; [cited 2023 Jun 28]. Available from: https://www.gov.bc.ca/CancerPlan2023.pdf. p. 10.

[8] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023. p. 71.

[9] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023. p. 59.

[10] Canadian Partnership Against Cancer. Cancer Screening in Canada: An Overview of Screening Participation for Breast, Cervical and Colorectal Cancer [Internet]. Toronto: Canadian Partnership Against Cancer; 2015. Available from: https://s22457.pcdn.co/wp-content/uploads/2019/01/Breast-Cervical-Colorectal-Screening-Participate-2015-EN.pdf

[11] Canadian Partnership Against Cancer. Breast cancer screening quality indicators report: data from 2012. Toronto (ON): Canadian Partnership Against Cancer; 2019 Jan. Available from: https://www.partnershipagainstcancer.ca/wp-content/uploads/2019/01/Breast-Cancer-Screen-Quality-Indicators-Report-2012-EN.pdf

[12] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023.

[13] Cancer Australia. Distribution of cancer stage [Internet]. National Cancer Control Indicators. 2015. Available from: https://ncci.canceraustralia.gov.au/diagnosis/distribution-cancer-stage/distribution-cancer-stage

[14] Bleicher RJ, Ruth K, Sigurdson ER, Beck JR, Ross E, Wong YN, Patel SA, Boraas M, Chang EI, Topham NS, Egleston BL. Time to Surgery and Breast Cancer Survival in the United States. JAMA Oncol. 2016 Mar;2(3):330-9. doi: 10.1001/jamaoncol.2015.4508. Erratum in: JAMA Oncol. 2016 Sep 1;2(9):1244. doi: 10.1001/jamaoncol.2016.2968. PMID: 26659430; PMCID: PMC4788555.

[15] Lohrisch C, Paltiel C, Gelmon K, Speers C, Taylor S, Barnett J, Olivotto IA. Impact on survival of time from definitive surgery to initiation of adjuvant chemotherapy for early-stage breast cancer. J Clin Oncol. 2006 Oct 20;24(30):4888-94. doi: 10.1200/JCO.2005.01.6089. Epub 2006 Oct 2. PMID: 17015884.

[16] Biganzoli L, Marotti L, Hart CD, Cataliotti L, Cutuli B, Kühn T, Mansel RE, Ponti A, Poortmans P, Regitnig P, van der Hage JA, Wengström Y, Rosselli Del Turco M. Quality indicators in breast cancer care: An update from the EUSOMA working group. Eur J Cancer. 2017 Nov;86:59-81. doi: 10.1016/j.ejca.2017.08.017. Epub 2017 Sep 28. PMID: 28963914.

[17] Cancer Research UK. Cancer Waiting Times [Internet]. Cancer Research UK; [date unknown]. Available from: https://www.cancerresearchuk.org/about-cancer/worried-about-cancer/cancer-waiting-times

[18] Cone EB, Marchese M, Paciotti M, Nguyen DD, Nabi J, Cole AP, Molina G, Molina RL, Minami CA, Mucci LA, Kibel AS. Assessment of time-to-treatment initiation and survival in a cohort of patients with common cancers. JAMA Netw Open. 2020 Dec 1;3(12) doi:10.1001/jamanetworkopen.2020.30072

[19] Manitoba Health. In Sixty: Breast Cancer Diagnostic Pathway [Internet]. Winnipeg: Manitoba Health; 2015 Mar 4. Available from: https://www.cancercare.mb.ca/export/sites/default/For-Health-Professionals/.galleries/files/diagnostic-pathway-files/IN60_BC-Revised-FullPath_02-02-2016.pdf

[20] Chaudhry M, Kandasamy S, Habbous S, Chan C, Barisic A, Faisal A, Walker M, Haque M, Sheppard A, Uri E, Ashu E, Schwartz N, Young S, McCurdy B. Cancer System Quality Index Report 2021. Ontario: Ontario Health; 2021. 138 p. Available from: https://www.ontariohealth.ca/sites/ontariohealth/files/csqi-report-2021.pdf

[21] Nasser JS, Huetteman HE, Chung TT, Chung KC. Unplanned emergency department visits within 30 days of mastectomy and breast reconstruction. Plast Reconstr Surg. 2018 Dec 1;142(6):1411-20.

[22] Tevis SE, Steiman JG, Neuman HB, Greenberg CC, Wilke LG. Postoperative complications in combined gynecologic, plastic, and breast surgery: an analysis from National Surgical Quality Improvement Program. Breast J. 2019 Nov;25(6):1111-6.

[23] Jonczyk MM, Jean J, Graham R, Chatterjee A. Trending towards safer breast cancer surgeries? Examining acute complication rates from a 13-year NSQIP analysis. Cancers. 2019 Feb 21;11(2):253.

[24] Agarwal S, Pappas L, Neumayer L, Kokeny K, Agarwal J. Effect of breast conservation therapy vs mastectomy on disease-specific survival for early-stage breast cancer. JAMA Surg. 2014 Mar 1;149(3):267-74.

[25] Vasilyeva E, Hamm J, Nichol A, Isaac KV, Bazzarelli A, Brown C, Lohrisch C, McKevitt E. Breast-Conserving Therapy is Associated with Improved Survival Without an Increased Risk of Locoregional Recurrence Compared with Mastectomy in Both Clinically Node-Positive and Node-Negative Breast Cancer Patients. Ann Surg Oncol. 2023 Oct;30(11):6413-6424. doi: 10.1245/s10434-023-13784-x.

[26] Biganzoli L, Marotti L, Hart CD, Cataliotti L, Cutuli B, Kühn T, Mansel RE, Ponti A, Poortmans P, Regitnig P, van der Hage JA. Quality indicators in breast cancer care: an update from the EUSOMA working group. Eur J Cancer. 2017 Nov 1;86:59-81. doi: 10.1016/j.ejca.2017.08.017.

[27] Canadian Institute for Health Information (CIHI), Canadian Partnership Against Cancer (CPAC). Breast Cancer Surgery in Canada, 2007–2008 to 2009–2010 [Internet]. Government of Canada; Available from: https://publications.gc.ca/collections/collection_2012/icis-cihi/H115-61-2010-eng.pdf

[28] Poortmans PM, Weltens C, Fortpied C. Correction to Lancet Oncol 2020. Lancet Oncol. 2020; 21:1602-10. DOI: https://doi.org/10.1016/S1470-2045(20)30733-6.

[29] Levine MN. Effective and safe regional node irradiation in early breast cancer. Lancet. 2023 Nov 3;402(10416):1943–5.

[30] Thorsen LBJ, Overgaard J, Matthiessen LW, Berg M, Stenbygaard L, Pedersen AN, et al. Internal Mammary Node Irradiation in Patients With Node-Positive Early Breast Cancer: Fifteen-Year Results From the Danish Breast Cancer Group Internal Mammary Node Study. J Clin Oncol. 2022 Apr 8;40(36).

[31] National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in Oncology [Internet]. NCCN, 2024 Mar 11; Version 2.2024. Available from: https://www.nccn.org/guidelines/guidelines-detail?category=2&id=1421

[32] National Institute for Health and Care Excellence. Early and locally advanced breast cancer: diagnosis and management, NICE Guideline [Internet]. NICE; 2018. Available from: https://www.nice.org.uk/guidance/ng101/chapter/Recommendations. p.31.

[33] Recht A, Comen EA, Fine RE, Fleming GF, Hardenbergh PH, Ho AY, Hudis CA, Hwang ES, Kirshner JJ, Morrow M, Salerno KE, Sledge GW, Solin LJ, Spears PA, Whelan TJ, Somerfield Mr, Elge SB. Postmastectomy radiotherapy: an American society of clinical oncology, American society for radiation oncology, and society of surgical oncology focused guideline

update. Pract Radiat Oncol. 2016;6(6):219-34. doi: 10.1016/j.prro.2016.08.009

[34] Regional Radiotherapy in Biomarker Low-Risk Node Positive and T3N0 Breast Cancer (TAILOR RT). ClinicalTrials.gov [Internet]. 2018 Oct 16. Available from: https://clinicaltrials.gov/study/NCT03488693#study-overview

[35] LeVasseur N. BC Cancer Protocol Summary for NEOAdjuvant Therapy for Triple Negative Breast Cancer using Dose Dense Therapy: Carboplatin and Weekly PACLitaxel Followed by DOXOrubicin and Cyclophosphamide. BC Cancer; 2021 May 1. Available from: http://www.bccancer.bc.ca/chemotherapy-protocols-site/Documents/Breast/BRLACTWACG_Protocol.pdf

[36] Von Minckwitz G, Schneeweiss A, Loibl S, Salat C, Denkert C, Rezai M, Blohmer JU, Jackisch C, Paepke S, Gerber B, Zahm DM. Neoadjuvant carboplatin in patients with triple-negative and HER2-positive early breast cancer (GeparSixto; GBG 66): a randomised phase 2 trial. Lancet Oncol. 2014 Jun 1;15(7):747-56. Available from: https://pubmed.ncbi.nlm.nih.gov/24794243/

[37] Sikov WM, Berry DA, Perou CM, Singh B, Cirrincione CT, Tolaney SM, Kuzma CS, Pluard TJ, Somlo G, Port ER, Golshan M. Impact of the addition of carboplatin and/or bevacizumab to neoadjuvant once-per-week paclitaxel followed by dose-dense doxorubicin and cyclophosphamide on pathologic complete response rates in stage II to III triple-negative breast cancer: CALGB 40603 (Alliance). J Clin Oncol. 2015 Jan 1;33(1):13-21. Available from: https://www.ncbi.nlm.nih.gov/pubmed/25092775

[38] Gandhi, S., Brackstone, M., Hong, N. J. L., Grenier, D., Donovan, E., Lu, F. I., Skarpathiotakis, M., Lee, J., Boileau, J. F., Perera, F., Simmons, C., Joy, A. A., Tran, W. T., & Canadian National Neoadjuvant Breast Cancer Consortium (2022). A Canadian national guideline on the neoadjuvant treatment of invasive breast cancer, including patient assessment, systemic therapy, and local management principles. Breast cancer research and treatment, 193(1), 1–20. https://doi.org/10.1007/s10549-022-06522-6

[39] Schmid, P., Cortes, J., Pusztai, L., McArthur, H., Kümmel, S., Bergh, J., Denkert, C., Park, Y. H., Hui, R., Harbeck, N., Takahashi, M., Foukakis, T., Fasching, P. A., Cardoso, F., Untch, M., Jia, L., Karantza, V., Zhao, J., Aktan, G., Dent, R., … KEYNOTE-522 Investigators (2020). Pembrolizumab for Early Triple-Negative Breast Cancer. The New England journal of medicine, 382(9), 810–821. https://doi.org/10.1056/NEJMoa1910549

Chapter 4: Cervical Cancer

Cervical Cancer Summary

Cervical cancer, while not as prevalent, is the fastest increasing cancer among females in Canada. In 2021, 210 B.C. women were diagnosed with cervical cancer, and 85 women died from it. B.C. has committed to eliminating cervical cancer as part of its 10-year cancer action plan.

Cervical cancer incidence rates peaked in the mid-1970s at 18 per 100,000, declined until 2006, and have slightly increased since. Similar trends have been reported been reported across Canada and in other countries. Mortality rates declined until 2009 but have since slightly increased, reaching 1.9 per 100,000 in 2021.

Recent increases in cervical cancer incidence and mortality are attributed to suboptimal screening uptake, lack of follow-up after screening, and low HPV vaccination coverage. In January 2024, B.C. rolled out a province-wide cervix self-screening program. Cervix self-screening reduces barriers to screening for patients who are hesitant to undergo a pelvic exam, for unattached patients and for those who have difficulty getting to or arranging for a primary care provider appointment.

Implementation of lower-barrier screening with cervix self-screening is expected to further improve screening participation.

Areas where B.C. is performing well include:

- *Age-standardized incidence rates* - B.C. was projected to experience the fourth lowest age-standardized incidence rate for females (7.4 compared to 8.0 for Canada excluding Quebec).
- *Age-standardized mortality rate* - B.C. was projected to have the third lowest age-standardized mortality rate for females, similar to the Canadian average (1.9 age-standardized mortality rate per 100,000 population).
- *Radical hysterectomy procedure performed by a gynecologic oncologist* – Since 2019, Gynecologist Oncologists performed 100% of radical hysterectomies for cervical cancer in B.C., aligning with best practices
- *Radical hysterectomy performed using an open technique* – B.C. transitioned to adopting open surgery as the standard of care for radical hysterectomy, increasing from 43% in 2016 to 100% by 2021.
- *Patients who received definitive radiotherapy with concurrent platinum-based chemotherapy (cisplatin)* - BC Cancer recommends concurrent chemoradiotherapy for all patients receiving definitive radiation for stages 1B1 to 4. In 2021, 81% of stage 1-3 cervical cancer patients in B.C. received radiotherapy with at least one cycle of concurrent cisplatin, and 65% received four or more cycles. B.C.'s rates were found to exceed the targets set in other jurisdictions.

Areas with room for improvement include:

- *Cervix screening participation rate* – In 2023, B.C.'s participation rate had returned to pre-pandemic levels to 63.6%, below the 70% target. Implementation of lower-barrier screening with cervix self-screening is expected to further improve screening participation.

This chapter also presents the following indicators, for which no assessment of performance has been made:

- Relative survival rates
- Cervix screening retention rate
- Colposcopy follow-up after abnormal cervix screening test
- Stage at diagnosis

- Time from diagnosis to first treatment
- Cervical cancer patients who receive pre-treatment MRI
- Unplanned readmissions and emergency department visits after surgery
- Time from start of radiation therapy for cervical cancer patients to completion

Data Sources

The main data source used in this section was the BC Cancer Registry, which at the time of this analysis included all cases of cancer among BC residents to the end of 2021. Indicators in this section are supported by linkage of the BC Cancer Registry to other health services data including the Surgical Patient Registry, the BC Cancer Pharmacy and Radiotherapy databases, the Discharge Abstract Database, and CASCADE screening information system. At the time of analysis these additional data sources typically had health service follow-up data available to the end of 2023. More details on data sources can be found in the accompanying technical appendix for this report.

Cervical Cancer Burden

Incidence, mortality and prevalence

- Vaccination against HPV is a key opportunity to prevent cancer; as such, it is a vital strategy to reduce the burden of cervical cancer.[1]
- Despite the availability of HPV immunization, cervical cancer, while not as prevalent, is the fastest increasing cancer in females in Canada.[2]
- B.C. has committed to eliminating cervical cancer as part of its 10-year cancer action plan.[3]
- Cervical cancer age-standardized incidence rates peaked in the mid-1970s at 18 per 100,000 population, and then started to decline until 2006, at which point rates began to slightly increase. Similar increases have been reported across Canada as well as in other countries.[2]
- In 2021, 210 women in B.C. were diagnosed with cervical cancer, representing an age-standardized incidence rate of 7.4 per 100,000 population.
- Mortality rates in B.C. declined until 2009 and then increased slightly. In 2021, 85 women died from cervical cancer, representing an age-standardized mortality rate of 1.9 per 100,000 population.
- The prevalence of British Columbian females ever diagnosed with cervical cancer has increased with time. At the start of 2022, 2,345 females ever diagnosed with cervical cancer were alive in B.C., approximately double the number in 1996.
- At the start of 2022, 64% of these women had been diagnosed more than five years previously, compared to 44% of women in 1996.
- Pan-Canadian comparisons reveal that B.C. was projected to experience the fourth lowest age-standardized incidence rate for females (7.4 compared to 8.0 for Canada excluding Quebec). Alberta (7.0), Manitoba (7.1) and Nova Scotia (6.3 per 100,000 age-standardized population) were expected to experience lower than B.C.[4]
- B.C. was projected to have the third lowest age-standardized mortality rate for females, similar to the Canadian average (1.9 age-standardized mortality rate per 100,000 population). Ontario (1.8) and Quebec (1.6) were expected to perform lower than B.C. in 2023.[5]
- The recent increases in cervical cancer incidence and mortality can be attributed to suboptimal screening uptake, lack of follow-up after screening as well as low HPV vaccination coverage. [2]
- Increased HPV vaccination, uptake of organized screening programs and timely treatment of precancerous lesions are key to decreasing cervical cancer incidence and eventually eradicating cervical cancer.[6]
- Although cervix screening was extremely effective in reducing the high incidence of cervical cancer observed in the 1970's, rates have not declined since 2005 in B.C. and in recent years have slowly started to increase. Further efforts to improve HPV vaccination coverage are warranted as are additional efforts to improve the delivery and effectiveness of cervix screening in B.C.

Table 4-1 Cervical cancer prevalence 2022

Year	Limited duration (years)	Prevalence count
2022	0 to 1	209
2022	>1 to 5	620
2022	>5 to 10	606
2022	>10 to 20	910

Notes: Prevalence reported as of January 1, 2022.

Limited duration (years) refers to the time since a cancer diagnosis, categorized to show the prevalence of cancer by years since diagnosis.

Figure 4-1 Cervical cancer annual prevalence counts by years since diagnosis

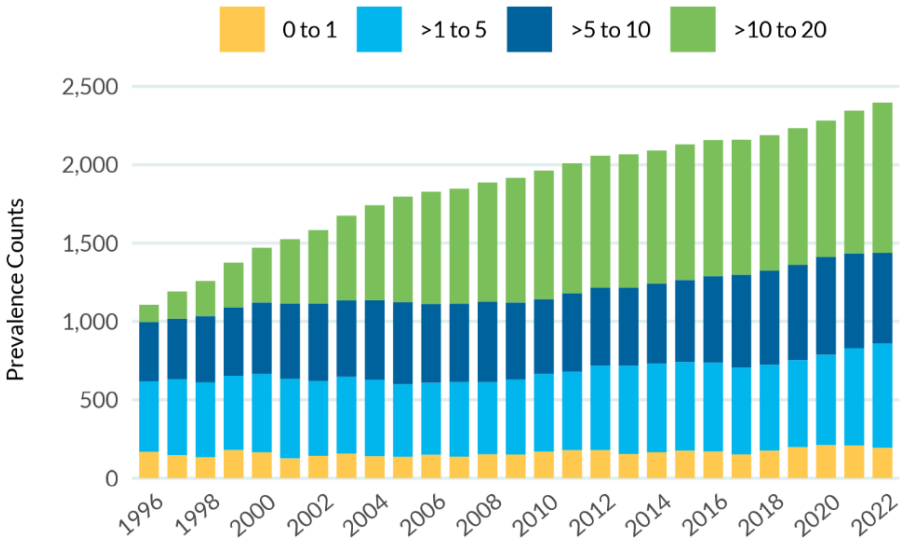
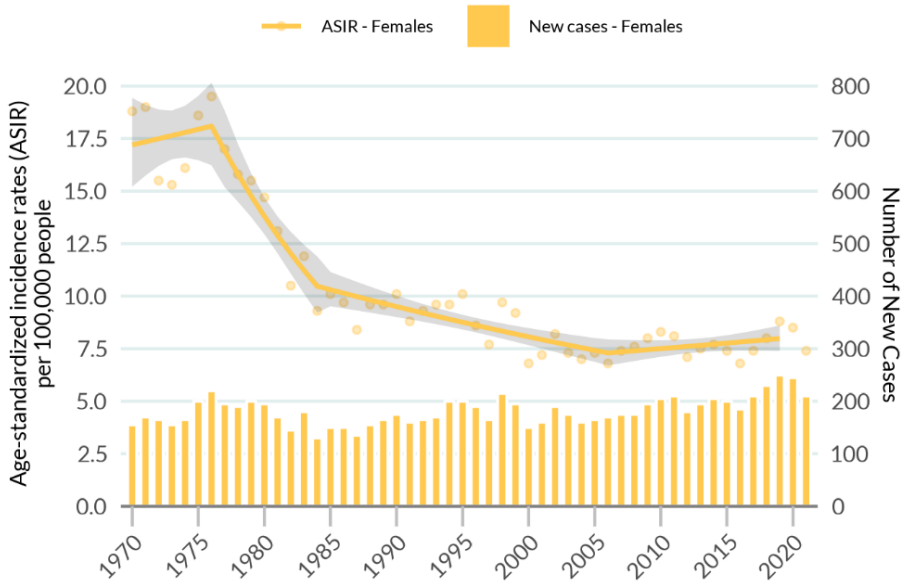


Table 4-2 Cervical cancer incidence 2021

Year	Incidence count	Age-std incidence rate (ASIR, per 100,000)
2021	210	7.4

Note: Standardized to 2011 Canadian Standard Population (Statistics Canada 2011 census)

Figure 4-2 Cervical cancer incidence trend



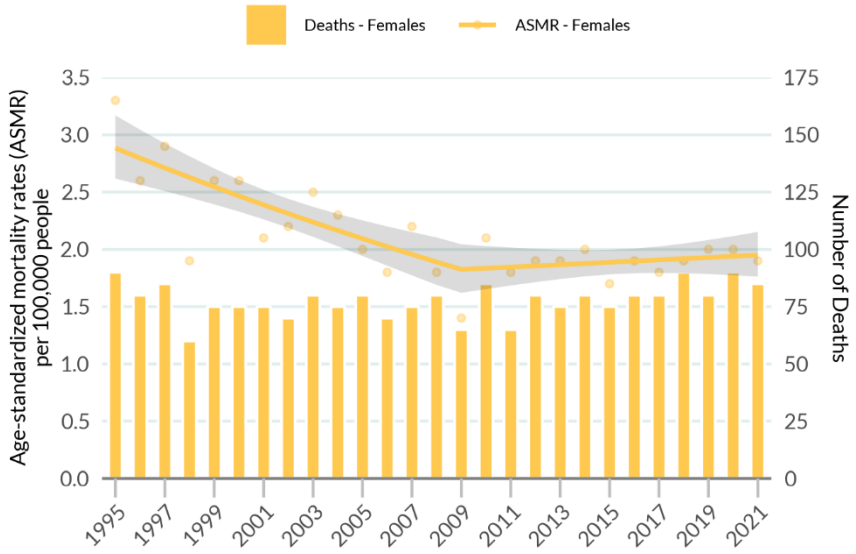
Note: The shaded grey area represents the 95% confidence interval for the ASIR

Table 4-3 Cervical cancer mortality 2021

Year	Mortality count	Age-std mortality rate (ASMR, per 100,000)
2021	85	1.9

Note: Standardized to 2011 Canadian Standard Population (Statistics Canada 2011 census)

Figure 4-3 Cervical cancer mortality trend



Note: The shaded grey area represents the 95% confidence interval for the ASMR

Survival

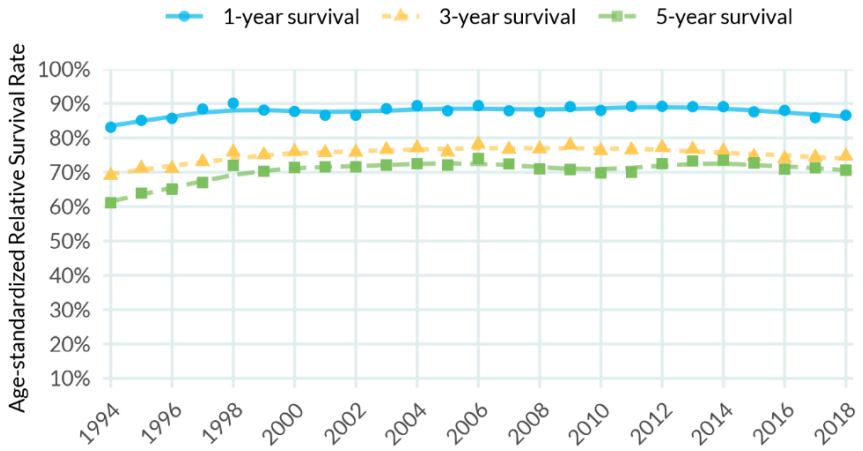
- Relative survival compares survival rates in those with cervical cancer with those without cervical cancer. It is also referred to as net survival.
- Cervical cancer survival rates have remained relatively steady through the 2000s.
- Data from 2021 reveals that on average, females with cervical cancer were 87% as likely to survive the first year after diagnosis relative to the general age-standardized population. Females ever diagnosed with cervical cancer were 71% as likely to survive the first five years after diagnosis relative to the general age-standardized population.
- B.C. one-year cervical cancer survival rates were projected to be slightly lower than the Canadian average (87% in B.C. in 2021 vs. 89% projected for Canada (excluding Quebec) for 2023).[7]
- Cervical cancer is a cancer that can currently be eradicated. Successful eradication will depend on effective vaccination, screening and treatment.[8]
- It is hoped that the recent introduction of the cervix self-screening program in B.C. will help increase survival statistics for cervical cancer in the coming years.

Table 4-4 Cervical cancer survival

Year	Survival time	Age-standardized relative survival rate (%)
2021	1-year	86.6
2021	3-year	74.7
2021	5-year	70.6

Note: Standardized to 2011 Canadian Standard Population (Statistics Canada 2011 census)

Figure 4-4 Cervical cancer survival trend



Cervix Screening and Pre-Diagnosis

Cervix screening participation rate

- This indicator measures the percentage of the B.C. eligible population 25-69 years of age who have completed at least one cytology screen in the previous 42 months.
- Participation in screening decreased during the COVID-19 pandemic but has recovered to pre-pandemic levels, reaching 63.6% in 2023.
- In B.C. the target for participation is 70%.
- The data represents screening with cytology only. Patients who participated in primary Human Papillomavirus (HPV) screening or who are followed for colposcopy surveillance are not accounted for in this data.
- In January 2024, B.C. rolled out a province-wide cervix self-screening program. Cervix self-screening reduces barriers to screening for patients who are hesitant to undergo a pelvic exam, for unattached patients and for those who have difficulty getting to or arranging for a primary care provider appointment.
- Implementation of lower-barrier screening with cervix self-screening is expected to further improve screening participation.

Table 4-5 Cervix screening participant rate

Year	Age Eligible for Screening	Screened (N)	Screening Participation Rate (%)
2019	1,382,908	876,466	63.4
2020	1,400,509	809,685	57.8
2021	1,425,840	848,458	59.5
2022	1,452,164	881,326	60.7
2023	1,470,265	935,223	63.6

Note: For the Year, the 42-month reporting period ends on Dec 31.

Cervix screening retention rate

- Screening retention is an important aspect of maintaining overall program participation. Returning to screen at the recommended interval increases the opportunity to identify cancer early and detect pre-cancer lesions.
- The screening retention rate has decreased over the last few years due to a policy change in 2016 to extend the screening interval to every 3 years and due to decreased access to health services during the COVID-19 pandemic.
- Although the 42-month retention rate decreased during the COVID-19 pandemic years, 60 months, retention rate data shows that patients are continuing to return to screen and are reaching similar pre-pandemic levels.
- Implementation of cervix self-screening is expected to improve access and thereby screening retention. Cervix self-screening reduces barriers to screening for patients who are hesitant to undergo a pelvic exam, for unattached patients and for those who have difficulty getting to or arranging for a primary care provider appointment.

Table 4-6 Cervix screening program retention rate

Index Screen Year	Index test result with recommendation of routine screening	Subsequent test within 42 months (N)	Subsequent test within 42 months (%)
2015	385,623	273,841	71.0
2016	343,148	225,438	65.7
2017	278,412	124,390	44.7
2018	270,078	158,711	58.8
2019	267,173	149,542	56.0

Note: Screening retention is the percentage of participants who had a normal screening test and returned for a subsequent screening test within 42 months.

Index screen year refers to the cohort year in which the initial screening test was performed and serves as the reference point for tracking subsequent tests within 42 months. For instance, an index year of 2019 would indicate a subsequent test around 2022.

Colposcopy follow-up after abnormal cervix screening test

- This indicator monitors adherence to follow-up colposcopy after an abnormal cytology result. Individuals who do not have follow-up colposcopy after an abnormal cytology result are at increased risk of being diagnosed with cervical cancer.
- The proportion of individuals who underwent colposcopy within 6 months of an abnormal cytology result increased from 86% in 2018 to 90% in 2022.
- There may be many reasons why people do not or cannot access follow-up colposcopy. Colposcopy is an intimate exam, most often completed in a hospital setting and can be away from home for patients. These are known barriers for vulnerable populations. Understanding barriers to patients completing follow-up colposcopy will provide the opportunity to address these and offer better support for participants.
- Continuing to improve follow-up colposcopy rate is an important factor in ensuring equitable access to care to reduce cervical cancer incidence and mortality in B.C.

Table 4-7 Colposcopy follow-up after abnormal cervix screening test

Year	Participants with recommendation of diagnostic follow-up due to abnormal Cytology or HPV screening	Diagnostic follow-up within 6 months (%)	Diagnostic follow-up within 12 months (%)
2018	3,832	85.9	90.2
2019	3,439	84.7	90.5
2020	2,776	86.2	91.5
2021	3,753	92.4	94.7
2022	3,767	90.0	93.4

Diagnosis

Stage at diagnosis

- Cancer staging is a method to classify cancer according to its extent and spread at the time of diagnosis. Cancer stage informs a patient's prognosis as well as their treatment options.
- Stage number is generally correlated with spread. In other words, the higher the stage number, the more the cancer has spread with the likelihood of worsened patient outcomes.
- Early diagnosis of cancer means treatment can be provided at the earliest possible stage which improves cancer survival and is therefore an important public health strategy.[9]
- In 2021, 209 cases in B.C. were diagnosed with cervical cancer.
- In 2021, a change in staging nomenclature was introduced that resulted in a shift in cervix cancer staging, impacting the distribution of stage at diagnosis compared to previous years.
    - The percentage of Stage 1 (35%) and Stage 2 (14%) of cases was lower than that seen between 2018 and 2020 (47-58% and 21-30% respectively). Conversely, a higher percentage of Stage 3 cases were seen in 2021 (28%) compared to previous years (4-9%). The percentage of Stage 4 cases remained stable (15% in 2021 compared to 11-16% between 2018 and 2020).
- Across Canada (2011-2015), the percentage of cervical cancer patients diagnosed with stage 4 disease in B.C. (13.3%) was higher than in Manitoba (8.7%), Alberta (10.1%), Nova Scotia (10.5%), Ontario (12.1%), and Canada overall (11.8%), but lower than in Saskatchewan (16.7%).[10] B.C. is currently at 15.3% of cervical cases diagnosed at stage 4 in 2021.
- Some studies in other jurisdictions, including Ontario, Australia and Romania, have suggested that the COVID-19 pandemic may have impacted cancer staging.[11,12,13,14]
- More recent data and further analysis is required to draw conclusions on B.C.'s stage at diagnosis for cervical cancer.

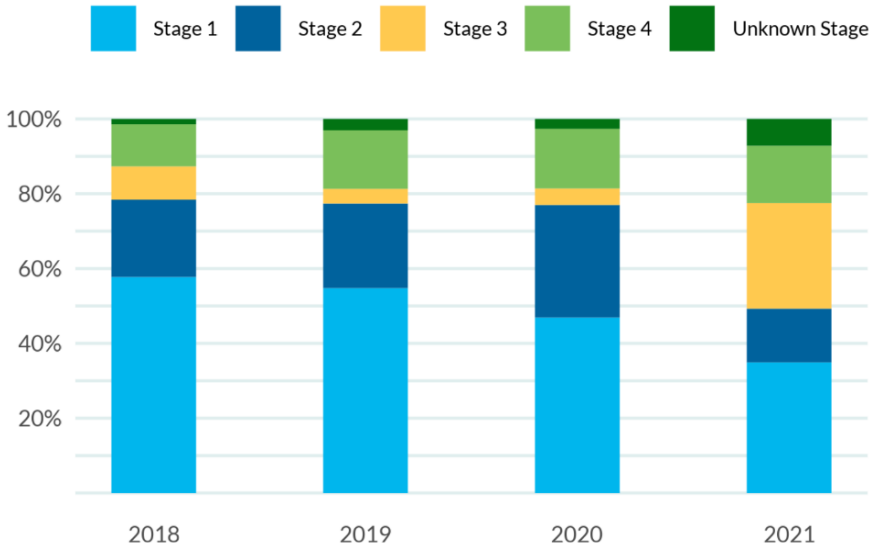
Table 4-8 Cervical cancer stage at diagnosis by year

Year	Stage 1 (%)	Stage 2 (%)	Stage 3 (%)	Stage 4 (%)	Unknown (%)
2018	57.7	20.7	8.9	11.3	1.4
2019	54.8	22.6	3.9	15.7	3.0
2020	46.9	30.1	4.4	15.9	2.7
2021	34.9	14.4	28.2	15.3	7.2

Notes: Unknown stage cases may arise when patients do not undergo the full diagnostic workup required to determine stage, or when the record of the workup is not complete.

Implementation of the American Joint Committee on Cancer (AJCC) shifted cervix cancer staging to TNM9 system in 2021 which resulted in stage shifts.

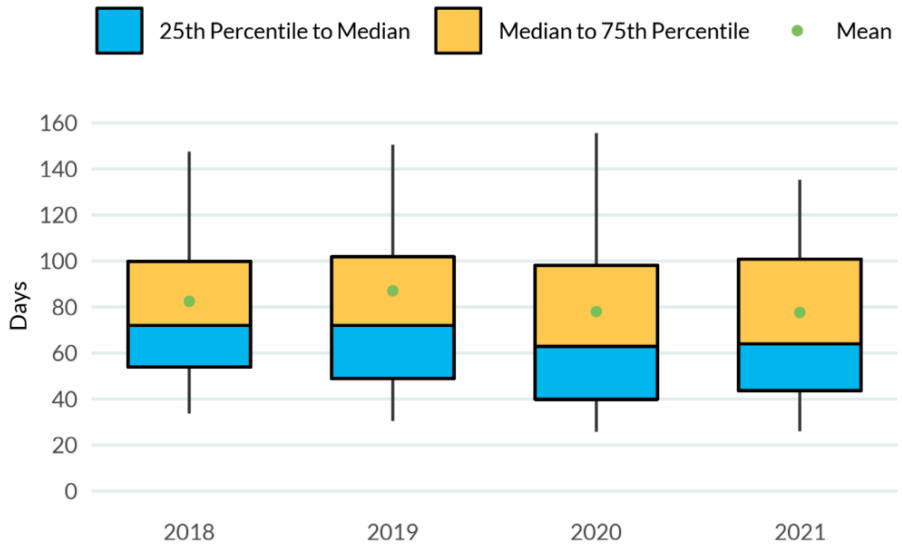
Figure 4-5 Cervical cancer stage at diagnosis by year



Time from diagnosis to first treatment

- Wait time measures are important from both a clinical and patient perspective. Excessive wait time can lead to disease progression and poorer prognosis. Long wait times can also negatively affect a patient's well-being.
- In B.C., median wait times from diagnosis to first treatment of cervical cancer decreased between 2018/19 (72 days) and 2020/21 (63-64 days).
- In 2021, 75% of patients commenced treatment within 101 days of diagnosis.
- Time to treatment decreased with increasing stage. Stage IV cases between 2018-2021 experienced a median wait time of 47 days compared to 87 days for Stage I patients.
- Wait times may vary depending on the service being sought. In 2021, the median wait time for the first surgical treatment was 89 days, and for the first chemo-radiation treatment was 60 days.
- Median wait times are longer in B.C. (72 days in 2018) compared to Ontario (60 days in 2018). [15]
- However, the B.C. median wait time in 2021 (64 days) was similar to the Ontario 2018 experience.
- A cursory international scan of wait time performance conducted by Ontario shows mixed results.[15]
- The Cancer Council of Australia has recommended that all treatment (surgery, radiation therapy and chemotherapy) be commenced within four weeks of the decision to treat.[16]
- Cancer Research UK has set targets of: 62 days (2 months) from the hospital receipt date of an urgent suspected cancer referral to start of treatment; and 31 days (1 month) from the decision-to-treat date to start of treatment.[17]
- Cancer guidelines in The Netherlands state that a maximum waiting time from diagnosis to first treatment of 5–7 weeks is acceptable for any type of malignancy.[18]
- Further investigation is required to assess variation in access to first treatment across B.C., and if and how access can be improved.

Figure 4-6 Time from diagnosis to first treatment by year

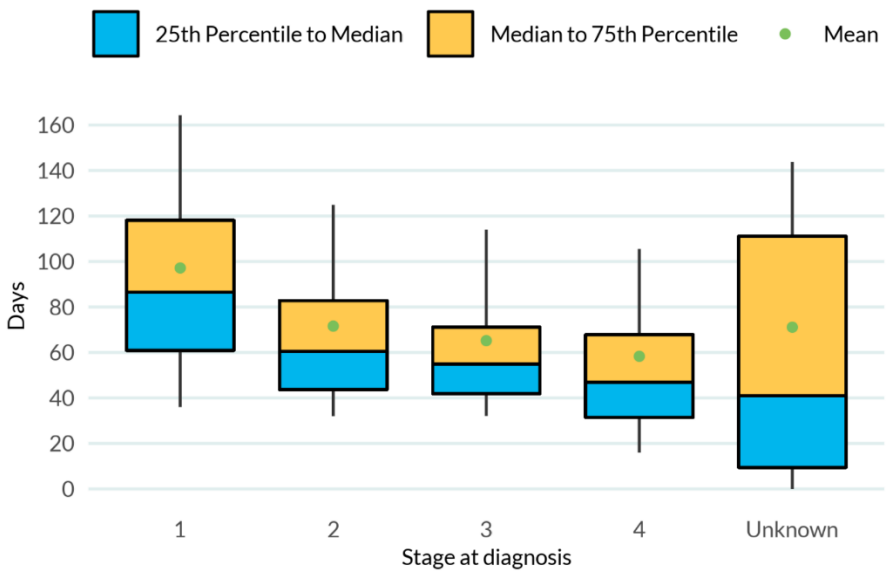


Notes: Range is the 10th to 90th percentiles.

Treatments include surgery, radiation therapy or systemic therapy.

Data table included in the Technical Supplement.

Figure 4-7 Time from diagnosis to first treatment by stage



Notes: Range is the 10th to 90th percentiles.

Treatments include surgery, radiation therapy or systemic therapy.

Data table included in the Technical Supplement.

Cervical cancer patients who receive pre-treatment MRI

- Pre-treatment Magnetic Resonance Imaging (MRI) is critical for patients with early-stage cervical cancer for initial staging and to determine appropriateness of surgery versus primary chemoradiation.
- BC Cancer guidelines also indicate pelvic MRI prior to commencing radiotherapy as standard of care for staging and treatment planning purposes.[19]
- In 2021, 69% of treated cervical cancer patients (excluding Stage IV) in B.C. received a pre-treatment pelvic MRI compared with 48% in 2018. This percentage peaked in 2020 at 74%.
- Results in 2019 were similar for B.C. (69%) and Ontario (67%).[15]
- NHS Scotland has set a target of 95% of patients with cervical cancer receiving MRI prior to definitive treatment (but excludes Stage IA1 and IVB cases).[20]
- In B.C. pre-treatment MRI for cervical cancer is below NHS Scotland thresholds but in line with other Canadian provinces.
- MRI in local staging of cervical cancer is critical in guiding appropriate treatment and considered the standard of care in B.C. Future efforts will be required to better understand barriers to MRI access.

Table 4-9 Cervical cancer patients who received a pre-treatment pelvic MRI

Year	Treated cervical cancer patients (N)	Pre-treatment MRI patients (N)	Pre-treatment MRI (%)
2018	157	75	47.8
2019	154	106	68.8
2020	163	121	74.2
2021	150	103	68.7

Notes: Pre-treatment MRI patients are those who had at least one pelvic MRI within 60 days prior to diagnosis or between diagnosis and treatment date, inclusive.

Excludes patients diagnosed with stage 4 cervical cancer.

Treatment

Unplanned readmissions and emergency department visits after surgery

- Unplanned Emergency Department (ED) visits and hospital readmissions post-surgery are associated with increased patient risk, patient discontent and resource utilization.
- Common reasons for hospital readmissions within 30 days of outpatient gynecologic oncology surgery include pain, gastrointestinal disturbance and surgical site infection.[21] While some unplanned visits may be unavoidable, others may be preventable.
- Between 2018 and 2023, 8-20% of women undergoing cervical cancer surgery experienced an unplanned ED visit and 3-9% experienced a hospital readmission within 30 days of surgery.
- While B.C. unplanned ED visit rates tended to be slightly lower than in Ontario (19% in B.C. and 22% in Ontario during 2018), room for improvement exists. A study from North Carolina reported a 30-day ED visit rate of 12.1% after surgery for a gynecologic malignancy.[22] A second study showed unplanned ED visit rates within 30 days of outpatient gynecologic surgery (not oncology specific) to be 5%.[21]
- Ontario hospital readmission rates within 30 days of surgery ranged from 4-6% between 2015 and 2019.[15] B.C. rates ranged from 3-9% (the increased variability in B.C. may be driven by the smaller volume of cervical cancer surgery cases). These results are comparable to those from a review of over 20,000 women between 2015 and 2017, identified from the National Surgical Quality Improvement Program, that showed an indicated readmission rate of 5.6%, comprising 4.3% due to indicated readmissions and 1.3% due to potentially avoidable readmissions.[23]
- The rate of unplanned emergency department visits and readmission rates seem to be consistent with Ontario, but further investigation is required to better understand the results.

Table 4-10 Unplanned emergency department visits and readmissions within 30 days of discharge from hospital post-surgery

Year	Patients who had surgeries (N)	Unplanned emergency department visits (%)	Readmissions (%)
2018	67	19.4	7.5
2019	77	7.8	3.9
2020	88	11.4	6.8
2021	59	18.6	3.4
2022	93	20.4	8.6
2023	78	17.9	2.6

Note: Results may exhibit a higher degree of variability due to the smaller number of cervical surgeries performed.

Time from start of radiation therapy for cervical cancer patients to completion

- Total radiation therapy treatment times beyond 56 days have been shown to adversely impact survival.[24] At the same time, there are multiple reasons (clinical or related to patient choice) why a patient may not complete radiotherapy within the desired 56 days.
- In 2021 in B.C., 85% of patients completed radiation therapy within 56 days.
- Percentages have remained relatively stable between 2016 and 2019 (83-88%). In 2020, rates peaked at 92%.
- In 2019, 83% of B.C. patients completed radiation therapy within 56 days, compared with 84% in Ontario.[15]
- The median time for completion has hovered at 49 days (excluding 2020).
- Scotland has set a target for 90% of patients with cervical cancer undergoing radical radiotherapy to have treatment completed within 56 days, and has consistently exceeded this target between 2014/15 and 2016/17.[25]
- Since 2023, and in accordance with internation guidelines, The BC Cancer Gynecology Tumour group has approved target completion times within 49 days. Subsequent analyses will review data with both 56-day and 49-day targets.

Table 4-11 Time from start of radiation therapy for cervical cancer to completion and percent completed within target

Year	Received radiation therapy (N)	Completed within 56 days (N)	Completed within 56 days (%)	Median (interquartile range) days
2016	59	52	88.1	49 (44, 54)
2017	70	59	84.3	49 (44, 53)
2018	77	66	85.7	49 (42, 55)
2019	90	75	83.3	47 (43, 52)
2020	100	92	92.0	44 (39, 51)
2021	98	83	84.7	49 (44, 54)

Radical hysterectomy procedure performed by a gynecologic oncologist

- Evidence suggests that patients with cervical cancer undergoing radical hysterectomy performed by gynecologic oncologists experience better surgical and survival outcomes compared to those treated by other specialties.[26]
- In B.C., from 2016 to 2021, 92.9% to 100% of patients requiring a radical hysterectomy had the procedure performed by a gynecologic oncologist.
- The European Society of Gynaecological Oncology has set a target of 100% for surgeries to be performed or supervised by either a certified gynecologic oncologist or a trained surgeon dedicated to gynecological cancer.[27]
- With rare exceptions, radical hysterectomy for cervical cancer in B.C. is performed by Gynecologist Oncologists which aligns with best practices.

Table 4-12 Patients requiring radical hysterectomy where procedure was performed by gynecologic oncologist

Year	Patients undergoing radical hysterectomy (N)	Performed by gynecological oncologist (N)	Performed by gynecological oncologist (%)
2016	14	14	100
2017	14	13	92.9
2018	32	30	93.8
2019	22	22	100
2020	28	28	100
2021	10	10	100

Radical hysterectomy performed using an open technique

- The Laparoscopic Approach to Carcinoma of the Cervix (LACC) trial in 2018 concluded that patient outcomes from minimally invasive surgery (MIS) were inferior to those from an open approach for radical hysterectomy.[28] As a result, gynecologic oncology practice changed around the world, with most jurisdictions, including B.C., adopting open radical hysterectomy as the standard of care.
- From 2016 to 2021, the percentage of radical hysterectomies in B.C. performed using an open technique increased from 43% in 2016 to 100% in 2021.
- Ontario's 2021 report noted an increase in their rate of surgeries performed using an open technique, from 34% in 2018 to 54% in 2019, due to evidence suggesting that open techniques offer better outcomes than minimally invasive techniques.
- Recent guidelines (updated in 2023) issued by the European Society of Gynecological Oncology (ESGO) noted a limited role for a minimally invasive approach to radical hysterectomy.[29]
- B.C. has performed well in adopting the open procedure as the standard of care for radical hysterectomy. Continued monitoring is necessary to ensure patients receive the optimal mode of surgery.

Table 4-13 Radical hysterectomy performed using open technique

Year	Patients radical hysterectomy (N)	Open procedure (N)	Open procedure (%)
2016	14	6	42.9
2017	14	9	64.3
2018	32	27	84.4
2019	22	21	95.5
2020	28	28	100.0
2021	10	10	100.0

Patients who received definitive radiotherapy with concurrent platinum-based chemotherapy (cisplatin)

- Receiving cisplatin-based chemotherapy in addition to radiotherapy has been shown to improve survival for cervical cancer.[30]
- BC Cancer recommends concurrent chemoradiotherapy for all patients receiving definitive radiation for stages 1B1 to 4 cervical cancer.
- In 2021, the rate of stage 1-3 patients receiving radiotherapy with at least one cycle of concurrent cisplatin was 81%, and 65% received 4 or more cycles of cisplatin.
- B.C.'s rates are similar to rates found in other jurisdictions.
    - Ontario reported that in 2019, 84% of cervical cancer patients (excluding stage 4) received 1+ cycle of cisplatin during definitive radiotherapy.
    - NHS Scotland achieved 83.7% in 2019/2020 of patients with cervical cancer undergoing radical radiotherapy who received concurrent chemotherapy, surpassing the target of 70%.[31] In 2021 NHS England achieved 82.4%.
    - In Japan, 79.9% of women diagnosed with cervical cancer in 2018 received a cisplatin-based regimen for concurrent chemoradiotherapy.[32]
- The rate of patients in B.C. receiving concurrent chemotherapy with radiotherapy exceeds targets from other jurisdictions and achieves comparable results.

Table 4-14 Number of cycles of cisplatin by a maximum of 14 days in-between chemotherapy dates for stage 1 to 3 patients

Year	Patients who received definitive radiotherapy (N)	Received 1+ cycle of cisplatin (%)	Received 4+ cycles of cisplatin (%)	Received 5+ cycles of cisplatin (%)
2018	76	76.3%	68.4%	57.9%
2019	77	83.1%	74.0%	64.9%
2020	88	85.2%	70.5%	61.4%
2021	88	80.7%	64.8%	56.8%

Notes: Surgery patients and patients diagnosed stage 4 and unknown are excluded.

Chapter End Notes

[1] Government of British Columbia. CancerPlan2023 [Internet]. Victoria, BC: Government of British Columbia; [cited 2023 Jun 28]. Available from: https://www.gov.bc.ca/CancerPlan2023.pdf. p. 14.

[2] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023. p. 22.

[3] Government of British Columbia. CancerPlan2023 [Internet]. Victoria, BC: Government of British Columbia; [cited 2023 Jun 28]. Available from: https://www.gov.bc.ca/CancerPlan2023.pdf. p. 2.

[4] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023. p. 29.

[5] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023. p.53.

[6] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023. p. 80.

[7] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023. p. 72.

[8] World Health Organization. Cervical Cancer Elimination Initiative [Internet]. www.who.int. 2022. Available from: Cervical Cancer Elimination Initiative (who.int)

[9] World Health Organization. Promoting cancer early diagnosis [Internet]. www.who.int. Available from: Promoting cancer early diagnosis (who.int)

[10] Canadian Partnership Against Cancer. Cervical cancer screening in Canada: Monitoring and evaluation of quality indicators – Results report 2011 to 2013 (2016). Toronto (ON): Canadian Partnership Against Cancer; updated 2016 July.

[11] Popescu A, Craina M, Pantea S, Pirvu C, Chiriac VD, Marincu I, Bratosin F, Bogdan I, Hosin S, Citu C, Bernad E. COVID-19 pandemic effects on cervical cancer diagnosis and management: A population-based study in Romania. Diagnostics. 2022 Apr 6;12(4):907. https://doi.org/10.3390/diagnostics12040907

[12] Smith M, Hall M, Simms K, Killen J, Sherrah M, O'Farrell X, Canfell K, Grogan P. Modelled analysis of hypothetical impacts of COVID-19 related disruptions on the National Cervical Screening Program. Cancer Council NSW. May 2020.

[13] Meggetto, O., Jembere, N., Gao, J., et al., 2021. The impact of the COVID-19 pandemic on the Ontario Cervical Screening Program, colposcopy and treatment services in Ontario, Canada: a population-based study. BJOG Int. J. Obstet. Gynaecol. 128 (9), 1503–1510. https://doi.org/10.1111/1471-0528.16741.

[14] Walker, M.J., Meggetto, O., Gao, J., et al., 2021. Measuring the impact of the COVID-19 pandemic on organized cancer screening and diagnostic follow-up care in Ontario, Canada: a provincial, population-based study. Prev. Med. 151, 106586 https://doi. org/10.1016/j.ypmed.2021.106586.

[15] Chaudhry M, Kandasamy S, Habbous S, Chan C, Barisic A, Faisal A, Walker M, Haque M, Sheppard A, Uri E, Ashu E, Schwartz N, Young S, McCurdy B. Cancer System Quality Index Report 2021. Ontario: Ontario Health; 2021. Available from: https://www.ontariohealth.ca/sites/ontariohealth/files/csqi-report-2021.pdf

[16] Cancer Council. Optimal care pathway for women with cervical cancer. 2020 Jan. Available from: https://www.cancer.org.au/assets/pdf/cervical-cancer-optimal-cancer-care-pathway

[17] Cancer Research UK. Cancer waiting times [Internet]. www.cancerresearchuk.org. Available from: https://www.cancerresearchuk.org/about-cancer/worried-about-cancer/cancer-waiting-times

[18] Hack AP, Zweemer RP, Jonges TN, van der Leij F, Gerestein CG, Peters M, Jürgenliemk-Schulz IM, van Rossum PS. Prognostic impact of waiting time between diagnosis and treatment in patients with cervical cancer: A nationwide population-based study. Gynecologic oncology. 2022 May 1;165(2):339-46.

[19] BC Cancer. Uterine Cervix cancer management manual [Internet]. Vancouver: BC Cancer. Available from: http://www.bccancer.bc.ca/health-professionals/clinical-resources/cancer-management-manual/gynecology/uterine-cervix

[20] NHS Scotland. Cervical Cancer Clinical Quality Performance Indicators (v4.0). Healthcare Improvement Scotland; 2014 Oct. Updated 2022 Apr. Available from: https://www.healthcareimprovementscotland.scot/wp-content/uploads/2024/06/CQPI-Cervical-Cancer.pdf

[21] Chaves KF, y Novoa VA, Apple A, Hassoun J, Alamri LA, Zhao Z, Yunker A. Prevalence of and risk factors for emergency department visits after outpatient gynecologic surgery. J Minim Invasive Gynecol. 2023 Jan 1;30(1):19-24. DOI: https://doi.org/10.1016/j.jmig.2022.09.555

[22] Doll KM, Snavely AC, Kalinowski A, Irwin DE, Bensen JT, Bae-Jump V, Boggess JF, Soper JT, Brewster WR, Gehrig PA. Preoperative quality of life and surgical outcomes in gynecologic oncology patients: a new predictor of operative risk?. Gynecologic oncology. 2014 Jun 1;133(3):546-51. doi: 10.1016/J.YGYNO.2014.04.002

[23] Pyrzak A, Saiz A, Polan RM, Barber EL. Risk factors for potentially avoidable readmissions following gynecologic oncology surgery. Gynecol Oncol. 2020 Oct 1;159(1):195-200.

[24] Vitzthum L, Yuan J, Jones D, Boldt A, Dusenbery K. Reducing prolonged chemoradiation treatment times for cervical cancer. BMJ open quality. 2019 Sep 1;8(3):e000516.

[25] Information Services Division. Cervix & Endometrial Cancer Quality Performance Indicators: Patients diagnosed between October 2014 and September 2017. NHS National Services Scotland; 2018 Dec. Available from: https://www.nhsscotlandnorth.scot/uploads/tinymce/NCA/QPI%20reports/2018-12-18-Cervix-and-Endometrial-QPI-Report.pdf

[26] Wu MF, Li J, Lu HW, Wang LJ, Zhang BZ, Lin ZQ. Impact of the care provided by gynecologic oncologists on outcomes of cervical cancer patients treated with radical hysterectomy. OncoTargets and therapy. 2016 Mar 10:1361-70.

[27] Cibula D, Planchamp F, Fischerova D, Fotopoulou C, Kohler C, Landoni F, Mathevet P, Naik R, Ponce J, Raspagliesi F, Rodolakis A. European Society of Gynaecological Oncology quality indicators for surgical treatment of cervical cancer. International Journal of Gynecologic Cancer. 2020 Jan 1;30(1).

[28] Ramirez PT, Frumovitz M, Pareja R, Lopez A, Vieira M, Ribeiro R, Buda A, Yan X, Shuzhong Y, Chetty N, Isla D. Minimally invasive versus abdominal radical hysterectomy for cervical cancer. New England Journal of Medicine. 2018 Nov 15;379(20):1895-904.

[29] Cibula D, Raspollini MR, Planchamp F, Centeno C, Chargari C, Felix A, Fischerová D, Jahnn-Kuch D, Joly F, Kohler C, Lax S. ESGO/ESTRO/ESP Guidelines for the management of patients with cervical cancer–Update 2023. Virchows Archiv. 2023 Jun;482(6):935-66.

[30] Song S, Rudra S, Hasselle MD, Dorn PL, Mell LK, Mundt AJ, Yamada SD, Lee NK, Hasan Y. The effect of treatment time in locally advanced cervical cancer in the era of concurrent chemoradiotherapy. Cancer. 2013 Jan 15;119(2):325-31.

[31] Public Health Scotland. Cervical Cancer Quality Performance Indicators Patients diagnosed between October 2017 and September 2020. Scotland: Public Health Scotland; 2021 Sep 14.

[32] Watanabe T, Mikami M, Katabuchi H, Kato S, Kaneuchi M, Takahashi M, Nakai H, Nagase S, Niikura H, Mandai M, Hirashima Y. Quality indicators for cervical cancer care in Japan. Journal of gynecologic oncology. 2018 Nov;29(6).

Chapter 5: Colorectal Cancer

Colorectal Cancer Summary

Colorectal cancer (CRC) is the third most commonly diagnosed cancer in Canada.

Compared to the rest of Canada, incidence rates for CRC are lower in B.C. than elsewhere. Still, in 2021 in B.C., 1,700 men and 1,500 women were diagnosed with CRC, and 640 men and 590 women died from CRC. Nearly 25,000 British Columbians previously diagnosed with CRC were alive in 2022, approximately triple the number in 1996.

The encouraging recent decreases in the incidence of CRC are generally attributed to the promotion of colon screening within the population. Colon screening can detect precancerous polyps which when removed do not progress to cancer diagnoses. Increasing screening uptake could help to reduce CRC incidence even further.

Areas where B.C. is performing well include:

- *Age-standardized incidence rates are lower than in the rest of Canada* - B.C. was projected to experience the second lowest age-standardized incidence rate for males in 2023 (52.0 compared to 60.5 for Canada excluding Quebec). B.C. was also projected to experience the lowest age-standardized incidence rate in 2023 for females (38.6 compared to 42.7 for Canada excluding Quebec).
- B.C. had the *lowest projected age-standardized mortality rate* for both males (21.0) and females (12.9) across Canada (24.2 for males, 15.7 for females) in 2023.
- *Colon cancer surgery reports with 12 or more nodes examined* - In 2023, in 95% of colon cancer surgeries, 12 or more lymph nodes were examined, exceeding the national target of 90%.
- *Rectal cancer surgery resection reports with involved (positive) circumferential radial margins* – B.C.'s performance in 2023 (7.3%) was below the target of 10% for this indicator.
- *Rectal cancer surgery resection reports with Total Mesorectal Excision (TME) Completeness* - B.C.'s performance has consistently exceeded 90%.

Areas with room for improvement include:

- *Time from diagnosis to first treatment* - In B.C., 50% of CRC cases in 2021 commenced treatment within 37 days, and 75% of cases in 2021 commenced treatment within 61 days. Cancer UK has recommended an ideal wait time of less than one month from diagnosis to first treatment but has recommended start of treatment within two months as a more realistic target.
- *Follow-up colonoscopy within 18 months of initial CRC surgery* – In 2022, 68% of recommended follow-up colonoscopies were performed within 18 months of initial surgery. BC Cancer has recommended surveillance colonoscopy be performed one year after the initial surgery, but sometimes this is delayed by up to 6 months due to the need for chemotherapy after surgery.

This chapter also presents the following indicators, for which no assessment of performance was made:

- Relative survival rates
- CRC screening participation rates
- Colonoscopy follow-up after an abnormal screening fecal immunochemical test (FIT)
- Stage at diagnosis
- B.C. unplanned ED and readmission rates within 30 days of CRC surgery
- Rectal cancer patients who receive pre-treatment MRI

Notably, an additional indicator has been developed but requires further cross-validation with clinicians. Efforts are underway with the BC Cancer Tumour Groups to ensure its inclusion in the next report:

- Hospitalization for bowel perforation within 7 and 14 days of outpatient colonoscopy.

Data Sources

The main data source used in this section was the BC Cancer Registry, which at the time of this analysis included all cases of cancer among BC residents to the end of 2021. Indicators in this section are supported by linkage of the BC Cancer Registry to other health services data including the Surgical Patient Registry, the BC Cancer Pharmacy and Radiotherapy databases, the Discharge Abstract Database, and CASCADE screening information system. At the time of analysis these additional data sources typically had health service follow-up data available to the **end of** 2023. More details on data sources can be found in the accompanying technical appendix for this report.

Cancer Burden

Incidence, mortality and prevalence

- Colorectal cancer (CRC) is the third most commonly diagnosed cancer in Canada.[1]
- Colon screening and primary prevention are the most effective strategies to reduce the burden of CRC. Colonoscopies can reduce both the incidence and mortality of CRC via early detection and removal of pre-cancerous growths. Prevention efforts include management of modifiable risk factors such as a sedentary lifestyle, excess body weight, alcohol consumption, cigarette smoking, and red/processed meat consumption.[2]
- CRC incidence rates remain higher for men than for women. For females, a decline in incidence rates was observed between 1985-1990, while for males, incidence was generally steady over this period. For both males and females, however, CRC incidence rates have consistently declined since 2014.
- In 2021 in B.C., 1,700 men were diagnosed with CRC. This represents an age-standardized incidence rate of 57.4 per 100,000 population.
- The CRC incidence rate for females is lower at 44.9 per 100,000, representing 1,500 new cases in 2021.
- While the volume of CRC deaths has slightly risen over time for both males and females, CRC mortality rates have steadily declined, with a sharper decline since 2014. In 2021, 640 men died from CRC, translating to an age-standardized mortality rate of 21 per 100,000 (compared to 34 per 100,000 in 1994). Also in 2021, 590 women died from CRC. This translates to an age-standardized mortality rate of 16 per 100,000 (compared to 24 per 100,000 in 1994).
- The prevalence of British Columbians alive today who have previously been diagnosed with CRC has increased. In 2022, nearly 25,000 British Columbians previously diagnosed with CRC were alive in B.C., approximately triple the number in 1996.
- In 2022, 60% of these residents had been diagnosed more than five years previously, compared to 38% of residents in 1996.
- The encouraging recent decreases in the incidence of CRC are generally attributed to the promotion of colon screening within the population. Colon screening can detect precancerous polyps which when removed do not progress to cancer diagnoses.
- Although not shown within this report, the incidence of CRC among younger adults is increasing in Canada.[3]
- Pan-Canadian comparisons reveal that B.C. was projected to experience the second lowest age-standardized incidence rate for males in 2023 (52.0 compared to 60.5 for Canada excluding Quebec). P.E.I. was lower at 50.4 per 100,000 age-standardized population.[1]
- B.C. was projected to experience the lowest age-standardized incidence rate in 2023 for females (38.6 compared to 42.7 for Canada excluding Quebec). SK experienced a similar age-standardized incidence rate (38.7).[1]

- In addition, B.C. had the lowest projected age-standardized mortality rate for both males (21.0) and females (12.9) across Canada (24.2 for males, 15.7 for females) in 2023.[4]
- The decreasing mortality rates of CRC patients are largely attributed to the positive impacts of earlier detection and to advances in the treatment of colorectal cancers.[5]
- The recent declines in CRC incidence among males and females highlight the potential of colon screening to reduce the incidence of cancer in our population. Further efforts to maximize screening uptake are encouraged based on these early successes since the BC Cancer Colon Screening Program was launched in 2013. Primary prevention efforts to reduce CRC burden among younger adults are warranted.

Table 5-1 Colorectal cancer prevalence 2022

Year	Limited Duration (years)	Prevalence count
2022	0 to 1	2,316
2022	>1 to 5	7,743
2022	>5 to 10	7,717
2022	>10 to 20	6,854

Notes: Prevalence reported as of January 1, 2022.

Limited duration (years) refers to the time since a cancer diagnosis, categorized to show the prevalence of cancer by years since diagnosis.

Figure 5-1 Colorectal cancer annual prevalence counts by years since diagnosis

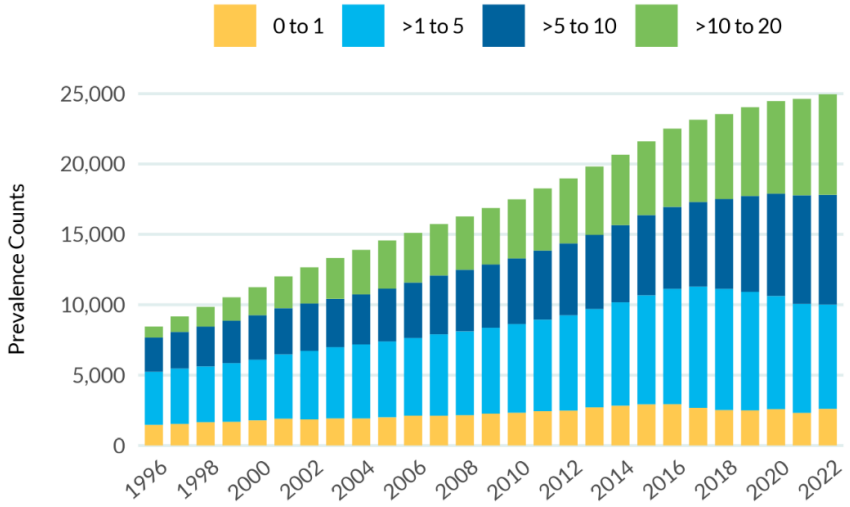


Table 5-2 Colorectal cancer incidence 2021

Year	Sex	Incidence count	Age-std incidence rate (ASIR, per 100,000)
2021	F	1,510	44.9
2021	M	1,700	57.4

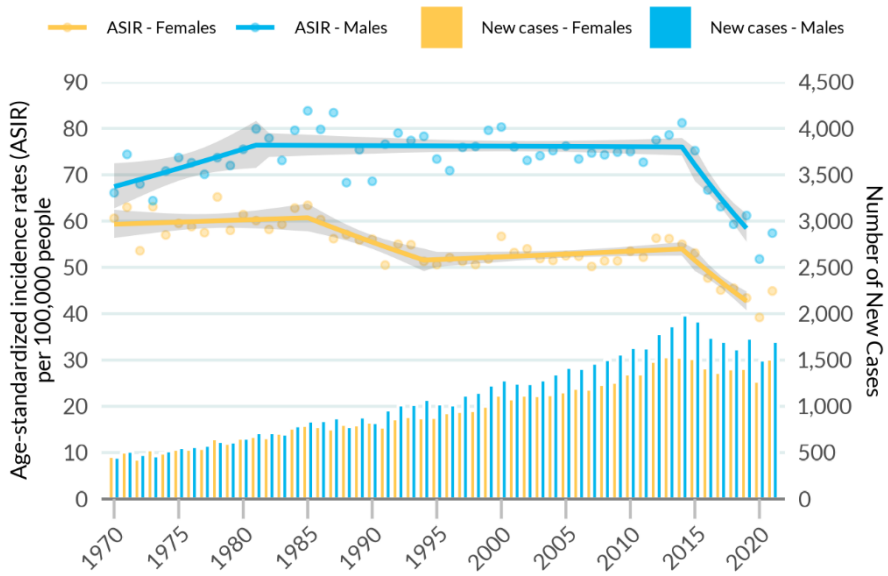
Note: Standardized to 2011 Canadian Standard Population (Statistics Canada 2011 census)

Table 5-3 Colorectal cancer mortality 2021

Year	Sex	Mortality count	Age-std mortality rate (ASMR, per 100,000)
2021	F	590	15.9
2021	M	640	21.0

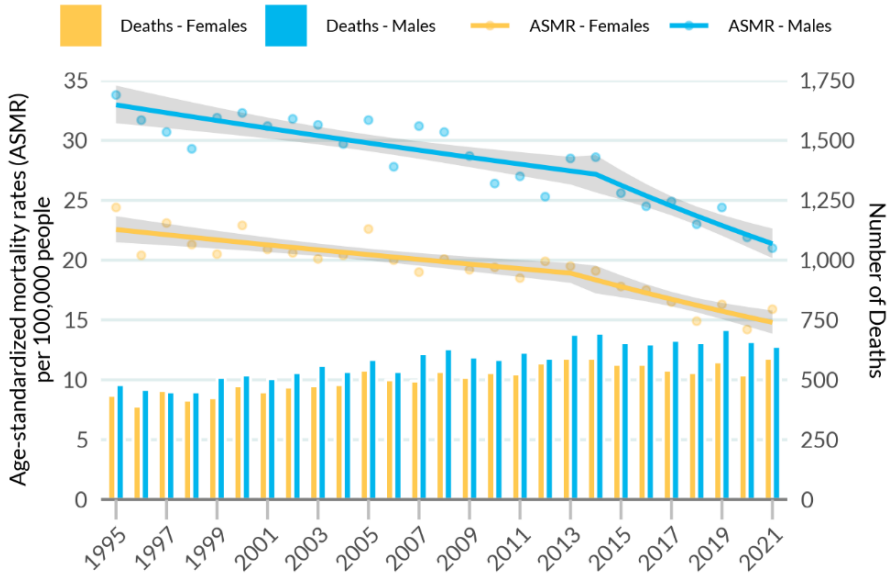
Note: Standardized to 2011 Canadian Standard Population (Statistics Canada 2011 census)

Figure 5-2 Colorectal incidence trend



Note: The shaded grey area represents the 95% confidence interval for the data.

Figure 5-3 Colorectal mortality trend



Note: The shaded grey area represents the 95% confidence interval for the data.

Survival

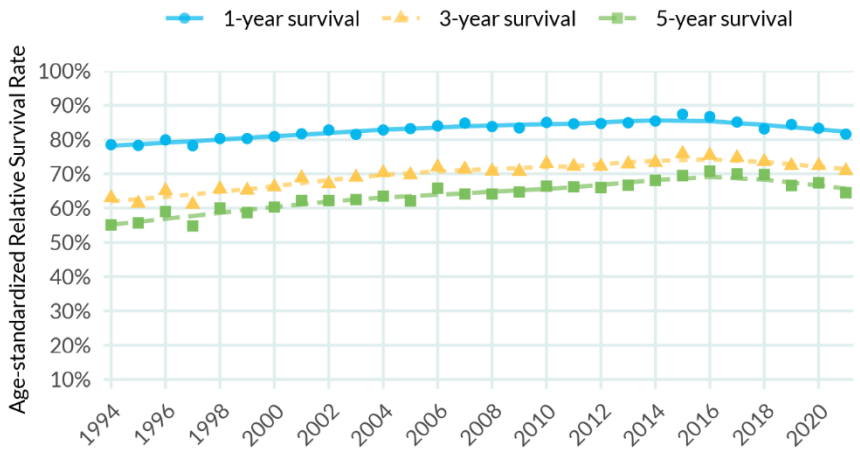
- Relative survival compares survival rates in those with CRC with those without CRC. It is also referred to as net survival.
- Survival rates have increased since the 1990s but peaked in 2015/16. The five-year survival has increased by 10% since 1994, with the highest improvement recorded at 15% in 2015.
- Data from 2021 reveals that on average, those diagnosed with CRC were 82% as likely to survive the first year after diagnosis relative to the general age-standardized population (compared to less than 80% in 1994). Persons ever diagnosed with CRC were 65% as likely to survive the first five years after diagnosis relative to the general age-standardized population (compared to 55% in 1994).
- Across Canada, predicted relative 5-year survival rates for CRC ranged from 62% in Nova Scotia to 68% in Newfoundland and Labrador. B.C. had a predicted relative 5-year survival rate of 67%, similar to the average for Canada, excluding Quebec (67%).[6]
- These trends likely are reflective of the significant advances in therapies for CRC between the 1990s and 2015. Since 2015, there have been incremental advances in therapies for subtypes of CRC but overall, the therapies have not changed dramatically over the past five years, which is reflective in the plateauing of the survival rates noted.

Table 5-4 Colorectal cancer survival 2021

Year	Survival time	Age-standardized relative survival rate (%)
2021	1-year	81.6
2021	3-year	70.9
2021	5-year	64.5

Note: Standardized to 2011 Canadian Standard Population (Statistics Canada 2011 census)

Figure 5-4 Colorectal cancer survival rate trend



Pre-Diagnosis and Screening

Fecal Immunochemical Test (FIT) participation rate

- The FIT is a screening test for colon cancer. It tests for hidden blood in the stool, which can be a sign of pre-cancer or early cancer.
- This indicator measures the percentage of the B.C. population 50-74 years of age who have completed at least one FIT in the previous 30 months.
- Participation in the Colon Screening Program has increased over the past 5 years, from 35% in 2019 to 40% in 2023.
- Reducing barriers to screening access, e.g., by mailing FIT kits directly to individuals who are due, has been demonstrated to improve screening participation.
- The data represents FIT participation only for those individuals registered in the Colon Screening Program. Northern Health Authority does not currently participate in the Program, and residents of Northern Health are not included in participation data. People that are not eligible for screening due to having had a colonoscopy in the last 10 years are not excluded from the denominator for this indicator.

Table 5-5 Fecal Immunochemical Test (FIT) participation rate

Year	FIT screening (N)	Number of 50-74 year olds (N)	FIT participation rate (%)
2019	530,459	1,533,463	34.6
2020	521,708	1,557,247	33.5
2021	543,611	1,573,617	34.5
2022	606,014	1,581,513	38.3
2023	626,009	1,585,338	39.5

Notes: The B.C. population of screen-eligible 50-74 year olds is adjusted to exclude individuals with pre-existing colorectal cancer.

For the Year presented, the 30-month reporting period ends on Dec 31.

Data is limited to participation in the formal Colon Screening Program.

Colonoscopy follow-up after an abnormal screening fecal immunochemical test (FIT)

- This indicator monitors adherence to follow-up colonoscopy after an abnormal FIT. Individuals who do not have a follow-up colonoscopy after an abnormal FIT are at increased risk of being diagnosed with colorectal cancer.
- The proportion of individuals who underwent colonoscopy within 6 months of an abnormal FIT increased from 64% in 2018 to 81% in 2022.
- There may be many reasons why people do not or cannot access follow-up colonoscopy. A colonoscopy is an intimate exam, most often completed in a hospital setting and can be away from home for patients. These are known barriers for vulnerable populations. Understanding barriers to patients completing follow-up colonoscopy will provide the opportunity to further increase follow-up rates.

Table 5-6 Colonoscopy follow-up after an abnormal screening fecal immunochemical test (FIT)

Year	Participants with recommendation of diagnostic follow-up due to abnormal screening FIT (N)	Diagnostic follow-up within 6 months (%)	Diagnostic follow-up within 12 months (%)
2018	53,972	64.0%	78.7
2019	30,946	59.9%	75.9
2020	19,641	80.5%	84.5
2021	33,580	81.4%	84.7
2022	27,620	81.1%	84.1

Diagnosis

Stage at diagnosis

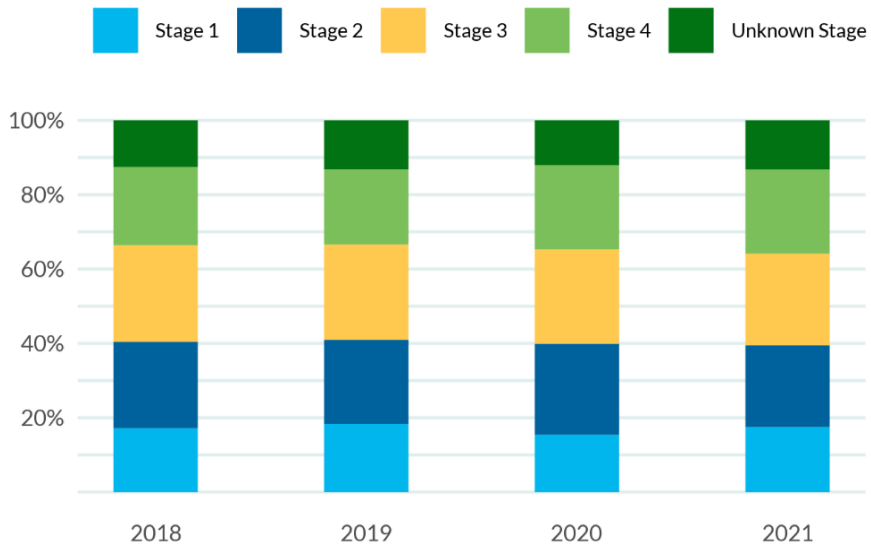
- Trends in early- versus late-stage colorectal cancers (CRC) diagnosed in B.C. between 2018 and 2021 are presented.
- Overall, the proportion of early stage vs. late-stage colorectal cancers has remained steady between 2018 and 2021.
    - In 2021, 17.5% of CRC diagnosed were at Stage 1 (compared with 17.2% in 2018). During this time, a small decrease in Stage II and Stage III cancers was noted (22% stage II and 24.7% stage III in 2021 compared with 23.3% stage II and 26% stage III in 2018.
    - The data shows a slight increase in the percentage of stage IV colorectal cancer observed (22.7 % stage IV in 2021 compared with 21.1% in 2018).
    - A slight increase in later stage cancers noted in 2020 and 2021 could possibly be related to reduced screening during the COVID-19 pandemic.
- The data, however, does not demonstrate a desirable shift to earlier stage diagnoses over the observed time period.
- The percentage of Stage 4 colon and rectal cancers diagnosed in B.C. from 2010-2014 appears to be among the lowest for participating jurisdictions in the International Cancer Benchmarking Partnership: [7]
    - For colon cancer, the percent of Stage 4 cases diagnosed ranged from 21% in Australia to 30% in UK, with Canada at 22%.
    - For rectal cancer, the percent of Stage 4 cases diagnosed ranged from 18% Australia to 25% Norway, with Canada at 19%.
- Further efforts to decrease the proportion of late-stage colorectal cancers diagnosed rely on increased uptake of screening measures which are dependent on improved resource availability, including access to family physicians and timely colonoscopies.

Table 5-7 Colorectal cancer stage at diagnosis

Year	Stage 1 (%)	Stage 2 (%)	Stage 3 (%)	Stage 4 (%)	Unknown (%)
2018	17.2	23.3	26.0	21.1	12.5
2019	18.4	22.6	25.7	20.2	13.2
2020	15.4	24.5	25.4	22.6	12.1
2021	17.5	22.0	24.7	22.7	13.2

Note: Unknown stage cases may arise when patients do not undergo the full diagnostic workup required to determine stage, or when the record of the workup is not complete.

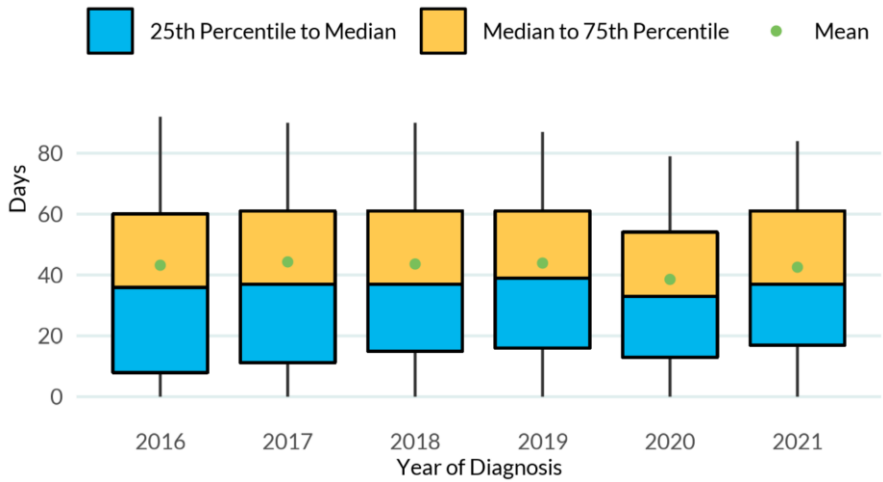
Figure 5-5 Colorectal cancer stage at diagnosis



Time from diagnosis to first treatment

- Wait time measures are important from both a clinical and patient perspective. Excessive wait time can lead to disease progression and poorer prognosis. Long wait times can also negatively affect a patient's well-being.
- Median wait times for any first treatment of colorectal cancer (CRC) in B.C. have been stable between 2016 (36 days) and 2021 (37 days), except for a slight dip in 2020 (33 days).
- During the COVID-19 pandemic, most non-urgent surgeries in Canada were postponed, increasing capacity for urgent services like cancer surgery and reducing wait times. As normal services resumed, CRC surgery wait times in B.C. have gradually increased back to pre-COVID levels.[8,9]
- The BC Surgical Patient Registry lists a wait-time target of 4 weeks for patients awaiting surgery for colon cancer.[10] Surgical delays beyond 6 weeks have been associated with worse 30-day mortality, 90-day mortality, and 5-year overall survival.[11]
- Cancer UK has recommended an ideal wait time of less than one month from diagnosis to first treatment but has recommended start of treatment within two months as a more realistic target.[12] In B.C., 50% of CRC cases commenced treatment within 37 days, and 75% of cases commenced treatment within 61 days in 2021.
- As the population of B.C. both ages and grows, there is increasing demand for oncology assessment for many cancers, including CRC. Treatment complexity has simultaneously increased. As a result, patients may require multidisciplinary review and subsequent referrals to other specialists to inform treatment planning, prior to the delivery of treatment. BC Cancer has developed a comprehensive strategy to recruit and retain oncologists to serve the needs of the population with the aim of reducing wait times in B.C.

Figure 5-6 Time from diagnosis to first treatment



Notes: Range is the 10th to 90th percentiles.

Data table included in the Technical Supplement.

Treatments include surgery, radiation therapy or systemic therapy.

Rectal cancer patients who receive pre-treatment MRI

- Magnetic resonance imaging (MRI) is established as the primary method to inform local staging and preoperative treatment planning in patients with rectal cancer.
- In 2021, 70% of rectal cancer patients received a pre-treatment MRI in B.C. The proportion of rectal patients receiving a pelvic MRI before initial treatment has increased by 30% since 2016 (from 54% to 70%).
- In Ontario in 2019, rates were higher with 77% receiving a pre-treatment MRI[13] compared to 68% in B.C.
- More recent data is required to assess B.C.'s performance.

Table 5-8 Rectal cancer patients who received a pre-treatment pelvic MRI

Year	Treated rectal cancer patients (N)	Pre-treatment MRI patients (N)	Pre-treatment MRI (%)
2016	781	421	53.9
2017	817	469	57.4
2018	696	430	61.8
2019	743	505	68.0
2020	681	441	64.8
2021	796	556	69.8

Note: Pre-treatment patients are those who had at least one pelvic MRI within 60 days prior to diagnosis or between diagnosis and treatment date, inclusive

Treatment

Unplanned emergency department visits or readmissions within 30 days of discharge from hospital post-surgery

- Unplanned Emergency Department (ED) visits and hospital readmissions post-surgery are associated with increased patient risk, patient discontent and increased resource utilization.
- Common reasons for hospital readmissions within 30 days of colorectal cancer (CRC) surgery include gastrointestinal complications, wound complications and stoma-related complications.[14] While some of these visits may be unavoidable, others may be preventable.
- Hospital readmission rates within 30 days of CRC surgery ranged from 9% to 11% between 2018 to 2023, while unplanned ED visit rates decreased from 20% to 15%. It is unknown the extent of this decrease that may be attributed to COVID-19-related disruptions.
- B.C. unplanned readmission rates after CRC surgery results are similar to those found in Ontario (8.5-10%)[13] and lower than in New Zealand (15%),[14] the UK (11.6%)[15] and the US (11-14%).[16]
- Implementation of enhanced recovery after surgery and rehabilitation programs in B.C. address variability in processes of care to decrease perioperative morbidity (correlated to readmission and ED visits).

Table 5-9 Unplanned emergency department visits or readmissions within 30 days of discharge from hospital post-surgery

Year	Patients who had surgeries (N)	Unplanned emergency department visits (%)	Readmissions (%)
2018	1,727	19.6	10.1
2019	1,736	18.7	9.9
2020	1,604	17.2	10.8
2021	1,634	15.9	9.5
2022	1,593	15.4	9.0
2023	1,555	16.1	10.2

Note: It was not possible to separate index colon cancer surgeries from rectal cancer surgeries in the data. Therefore, combined rates for 'colorectal' cancer are presented in the data table above.

Colon cancer surgery reports with 12 or more nodes examined

- This indicator represents a composite of quality surgery and quality pathologic assessment of the surgical specimen.
- Assessing regional lymph nodes for cancer cells allows for more accurate staging of the cancer and can remove locoregional disease. Determining the right stage ensures that the most appropriate care is received post-surgery (chemotherapy or none) and allows for an accurate prognosis.
- BC Cancer recommends that for colon cancer patients, 12 or more lymph nodes be removed and examined to adequately stage colorectal cancer, recognizing that this is not possible for 100% of patients.
- In 95% of colon cancer surgeries, 12 or more lymph nodes were examined in 2023. The percentage increased from 89% in 2019.
- B.C. is exceeding the national target of 90%.[17]

Table 5-10 Colon cancer surgery reports with 12 or more nodes examined

Year	Colon cancer surgeries (N)	12+ lymph nodes examined (N)	12+ lymph modes examined (%)
2019	943	840	89.1
2020	919	824	89.7
2021	1,020	957	93.8
2022	1,043	973	93.3
2023	1,088	1,036	95.2

Rectal cancer surgery resection reports with involved (positive) circumferential radial margins

- Surgery is the primary treatment for patients with rectal cancer; other forms of treatment, such as radiation or chemotherapy, are often used to complement surgical treatment.
- Patients with negative margins for rectal cancer resections have been shown to have decreased local recurrence rates and increased survival as compared with patients with positive margins.
- In 2023, 7.6% of B.C. rectal cancer surgery resections had positive margins (circumferential radial margins).
- B.C.'s performance in 2019 (8.4%) was similar to that of Ontario (8.4%) and below the Ontario target of 10% for this indicator. [13]
- Scotland has set targets of:[18]
    - 5% for primary surgery cases, or immediate/early surgery following neo-adjuvant short course radiotherapy; and
    - 15% for surgery following neo-adjuvant chemotherapy, long course chemoradiotherapy or short course radiotherapy with delay to surgery.

Table 5-11 Rectal cancer surgery resection reports with involved (positive) circumferential radial margins

Year	Rectal cancer surgeries (N)	Positive margins (N)	Positive margins (%)
2019	415	35	8.4
2020	379	37	9.8
2021	449	37	8.2
2022	456	39	8.6
2023	458	35	7.6

Rectal cancer surgery resection reports with Total Mesorectal Excision (TME) completeness

- Surgery is the primary treatment for patients with rectal cancer; other forms of treatment, such as radiation or chemotherapy, are often used to complement surgical treatment.
- Patients with complete TME for rectal cancer resections have been shown to have decreased local recurrence rates and increased survival as compared with patients with incomplete TME.
- Patients in B.C. with rectal cancer had a 94% rate of complete or near complete TME in 2023.
- Completeness of TME is a marker of quality rectal cancer surgery.
- B.C.'s performance is consistently above 90% for completeness of TME.

Table 5-12 Rectal cancer surgery resection reports with Total Mesorectal Excision (TME) completeness

Year	Rectal cancer surgeries (N)	TME completeness (N)	TME completeness (%)
2019	337	314	93.2
2020	347	316	91.1
2021	363	349	96.1
2022	371	346	93.3
2023	377	356	94.4

Survivorship Care

Follow-up colonoscopy within 18 months of initial colorectal cancer surgery

- Surveillance colonoscopy one year after curative resection for colorectal cancer (CRC) is widely recommended as a method to help detect any recurring or new cancers quickly at a curable stage.
- This indicator looks at the percentage of CRC surgery survivors receiving a follow-up colonoscopy within 18 months of their initial CRC surgery. The 18-month timeframe accommodates time for adjuvant therapy as well as providing a grace period for booking.
- In 2022, 35% of candidates received a colonoscopy within 12 months of their initial CRC surgery, and 68% within 18 months. The proportion climbed to 76% when expanded to within 24 months of initial CRC surgery. Proportions are similar for 2021.
- Proportions are slightly lower in B.C. relative to Ontario (38% within 12 months and 71% within 18 months in 2018).[13]
- Both BC Cancer[19] and Cancer Care Ontario[19] have recommended surveillance colonoscopy be performed one year after the initial surgery.
- The vast majority of patients undergo adjuvant treatment post resection for 3-6 months, or with rectal cancer, undergo 8-10 months of peri-operative treatment (including surgery) and therefore are not referred until almost the 1-year mark to allow for recovery. In addition, endoscopy time is limited. There is a trend towards giving only 3 months of adjuvant chemotherapy in colon cancer so patients may recover sooner, but in the case of rectal cancer, the treatment period may still impact when referrals are made.

Table 5-13 Follow-up colonoscopy by time from initial colorectal cancer surgery

Year	Survivors at 12 months (N)	Colonoscopy within 12 months of initial surgery (%)	Colonoscopy within 18 months of initial surgery (%)	Colonoscopy within 24 months of initial surgery (%)
2021	1,054	36.0	66.6	73.9
2022	1,109	34.9	67.9	75.5

Chapter End Notes

[1] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023. p. 29.

[2] Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, Bray F. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA: a Cancer Journal for Clinicians [Internet]. 2021 Feb 4;71(3):209–49. Available from: https://acsjournals.onlinelibrary.wiley.com/doi/10.3322/caac.21660

[3] Brenner DR, Heer E, Sutherland RL, Ruan Y, Tinmouth J, Heitman SJ, Hilsden RJ. National trends in colorectal cancer incidence among older and younger adults in Canada. JAMA Network Open. 2019 Jul 3;2(7):e198090.

[4] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023. p. 53.

[5] Government of British Columbia. CancerPlan2023 [Internet]. Victoria, BC: Government of British Columbia; [cited 2023 Jun 28]. Available from: https://www.gov.bc.ca/CancerPlan2023.pdf. p. 10.

[6] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023. p. 71.

[7] Araghi M, Arnold M, Rutherford MJ, Guren MG, Cabasag CJ, Bardot A, Ferlay J, Tervonen H, Shack L, Woods RR, Saint-Jacques N. Colon and rectal cancer survival in seven high-income countries 2010–2014: variation by age and stage at diagnosis (the ICBP SURVMARK-2 project). Gut. 2021 Jan 1;70(1):114-26.

[8] Reason B, Pichora E, Johnson T. How were wait times for priority procedures in Canada impacted during the first six months of the COVID-19 pandemic?. Healthcare Quarterly (Toronto, Ont.). 2022 Jan 1;24(4):11-5.

[9] Shojaei D, Bakos B, Loree J, Mah A, So A, McGahan C, Phang TP, Brown CJ. Impact of the COVID-19 Pandemic on Access to Cancer Surgery: Analysis of Surgical Wait Times in British Columbia, Canada. Disaster Medicine and Public Health Preparedness. 2023 Jan;17:e565.

[10] BC Surgical Patient Registry. BC Patient Condition and Diagnosis Descriptions General Surgery [Internet]. 2022. Available from: https://www.interiorhealth.ca/sites/default/files/PDFS/general-surgery-patient-condition-and-diagnosis-descriptions.pdf

[11] Lo BD, Caturegli G, Stem M, Biju K, Safar B, Efron JE, Rajput A, Atallah C. The impact of surgical delays on short-and long-term survival among colon cancer patients. The American Surgeon. 2021 Nov;87(11):1783-92.

[12] Cancer waiting times [Internet]. www.cancerresearchuk.org. Cancer Research UK; Available from: https://www.cancerresearchuk.org/about-cancer/worried-about-cancer/cancer-waiting-times

[13] Chaudhry M, Kandasamy S, Habbous S, Chan C, Barisic A, Faisal A, Walker M, Haque M, Sheppard A, Uri E, Ashu E, Schwartz N, Young S, McCurdy B. Cancer System Quality Index Report 2021. Ontario: Ontario Health; 2021. Available from: https://www.ontariohealth.ca/sites/ontariohealth/files/csqi-report-2021.pdf

[14] Xu W, Wells CI, McGuinness M, Varghese C, Keane C, Liu C, O'Grady G, Bissett IP, Harmston C. Characterising nationwide reasons for unplanned hospital readmission after colorectal cancer surgery. Colorectal Disease. 2023 May;25(5):861-71.

[15] National Bowel Cancer Audit. National Bowel Cancer Audit - Annual Report 2020: An audit of the care received by people with bowel cancer in England and Wales [Internet]. 2020. Available from: https://www.nboca.org.uk/wp-content/uploads/2020/12/NBOCA-2020-Annual-Report.pdf

[16] Xu W, Wells CI, McGuinness M, Varghese C, Keane C, Liu C, O'Grady G, Bissett IP, Harmston C. Characterising nationwide reasons for unplanned hospital readmission after colorectal cancer surgery. Colorectal Disease. 2023 May;25(5):861-71.

[17] Canadian Partnership Against Cancer. Cancer System Performance 2018 Report. Toronto, ON: Canadian Partnership Against Cancer; 2018 p. 1-63.

[18] Healthcare Improvement Scotland. Colorectal Cancer: Clinical Quality Performance Indicators. NHS Scotland; 2012 Dec. Updated 2021 Jul. Version 4.0. Available from: https://www.healthcareimprovementscotland.scot/wp-content/uploads/2024/06/CQPI-Colorectal-Cancer.pdf

[19] Members of the Colorectal Cancer Survivorship Guideline Development Group. Follow-up care, surveillance protocol, and secondary prevention measures for survivors of colorectal cancer. Toronto (ON): Ontario Health (Cancer Care Ontario); 2021 March 31. Program in Evidence-based Care Evidence-Based Series No.: 26-2 Version 3.

Chapter 6: Lung Cancer

Lung Cancer Summary

Lung cancer is the leading cause of cancer death in Canada. In 2021, 1,745 B.C. males were diagnosed with lung cancer, and 1,855 B.C. females were diagnosed.

As of 2022, more than 10,000 British Columbians ever diagnosed with lung cancer were alive, nearly triple the number in 1996. Thirty-five percent had been diagnosed more than five years previously, up from 26% in 1996.

B.C. has the lowest projected lung cancer mortality rates for both males and females. As of 2021, those with lung cancer were 54% as likely to survive the first year after diagnosis relative to the general age-standardized population (compared to 37% in 1994). The recent introduction of an organized lung cancer screening program in 2022 may further reduce mortality.

Despite declining incidence rates, lung cancer remains a significant public health issue, causing over 2,200 deaths annually in B.C. A continuing focus on primary prevention, and tobacco and vaping avoidance and cessation, will contribute to further decreases in future lung cancer incidence rates.

Areas where B.C. is performing well include:

- *Age-standardized incidence rates* - B.C. is projected to have the lowest lung cancer incidence rate for males (53.6 versus the Canadian average of 60.1 per 100,000) and the second lowest for females (56.8 versus the Canadian average of 58.4 per 100,000) in Canada for 2023.
- *Age-standardized mortality rates* - B.C. was projected to experience the lowest age-standardized lung cancer mortality rates for both males (38.8 versus the Canadian average of 48.2 per 100,000) and females (31.8 versus a Canadian average of 36.9 per 100,000) in 2023.
- *Lung Screening* – In 2022, B.C. became the first province in Canada to launch a province-wide lung cancer screening program for high-risk individuals aged 55-74. In the first 18 months, 8,100 participants were screened, detecting lung cancer at a rate of 16.3 per 1,000 participants. Of the detected cancers, 74% were early stage (stage I/II), marking a significant shift toward earlier detection. By comparison, prior to the screening program's launch in 2021, only 35% of cases were diagnosed at early stages. This shift suggests a potential future reduction in lung cancer mortality.
- *Unplanned emergency department visits within 30 days of discharge from hospital post-surgery* – In 2023, hospital readmission rates within 30 days of lung cancer surgery were 5%, and unplanned emergency department visits were 15%, which were found to be lower or comparable to rates in other jurisdictions.
- 30-*Day and 90-Day Post-Surgery Mortality* - In 2023, the 30- and 90-day post-surgery mortality rates in B.C. were 0.28% and 0.46%, respectively. B.C. thoracic surgery sites have among the lowest postoperative mortality rates in Canada for lung cancer resections.
- *Stage 3 Non-Small Cell Lung Cancer (NSCLC) patients who received immunotherapy following chemoradiation* - In 2021, 68% of stage 3 NSCLC patients in B.C. received immunotherapy after chemoradiation. This rate marks a significant increase since 2018 (9%), coinciding with the approval of Durvalumab in Canada.

Areas with room for improvement include:

- *Time from diagnosis to first non-surgical treatment* - In B.C., in 2021, 50% of lung cancer cases (excluding surgery) began

treatment within 46 days, and 75% within 73 days. For higher-stage disease, these wait times are clinically acceptable and align with other regions. However, time to treatment for early-stage disease is longer compared to other areas.

- *Time from booking form received to surgery* - During the COVID-19 pandemic urgent services like cancer surgery were prioritized over non-urgent surgeries, reducing wait times. However, as normal services resumed, lung cancer surgery wait times in B.C. gradually increased, surpassing pre-COVID levels. In 2023, B.C.'s median wait time of 28 days exceeded Canada's average of 26 days, and the B.C. Ministry set target wait time of 'within 2 weeks.'
- *Limited-stage SCLC patients who received chemoradiation* - In 2021, 40% of LS-SCLC patients received chemoradiation, down from 56.6% in 2018 and lower than rates found in other jurisdictions.

This chapter also presents the following indicators, for which no assessment of performance has been made:

- Relative survival rates
- Stage at diagnosis
- Stage 2 NSCLC patients who received a post-surgery medical oncology consultation

Notably, an additional indicator has been developed but requires further cross-validation with clinicians. Efforts are underway with the BC Cancer Tumour Groups to ensure its inclusion in the next report:

- NSCLC Patients who received PET-CT scan prior to treatment

Data Sources

The main data source used in this section was the BC Cancer Registry, which at the time of this analysis included all cases of cancer among BC residents to the end of 2021. Indicators in this section are supported by linkage of the BC Cancer Registry to other health services data including the Surgical Patient Registry, the BC Cancer Pharmacy and Radiotherapy databases, the Discharge Abstract Database, and CASCADE screening information system. At the time of analysis these additional data sources typically had health service follow-up data available to the end of 2023. More details on data sources can be found in the accompanying technical appendix for this report.

Burden

Incidence, Mortality and Prevalence

- Lung cancer has been identified as the leading cause of cancer death in Canada.[1] Although tobacco smoking is the major cause of lung cancer, other factors such as air pollution, second-hand smoking, radon and other modifiable exposures are important contributors to lung cancer development.[2]
- Lung cancer age-standardized incidence rates for B.C. males rose steadily until they peaked in 1984 (110 new cases per 100,000 people) and then steadily declined. In 2021, 1,745 males were diagnosed with lung cancer representing an age-standardized incidence rate of 55.8 per 100,000 population.
- Age-standardized incidence rates also steadily rose for females until they peaked in 1992 (60 per 100,000 population), and then plateaued until 2016. It is too early to discern if the small decrease in incidence rates between 2016 and 2021 represents a true decline or is due to random variation. In 2021, the incidence count of 1,855 new cases (representing an age-standardized incidence rate of 52.1 per 100,000) was higher for females than males, continuing a pattern which began a decade ago.
- Age-standardized incidence rates were historically higher for males than females until 2018 when rates converged.
- Mortality rates for both males and females have been decreasing over time. In 2021, 1,190 males died from lung cancer at an age-standardized mortality rate of 37.9 per 100,000. Also in 2021, 1,150 females died from lung cancer at an age-standardized mortality rate of 31.5 per 100,000.
- The prevalence of British Columbians ever diagnosed with lung cancer has increased. As of January 1, 2022, more than 10,000 British Columbians ever diagnosed with lung cancer were alive in B.C., approximately triple the number in 1996.
- At the start of 2022, 35% of these residents had been diagnosed more than five years previously, compared to 26% of residents in 1996.
- The difference in lung cancer incidence trends for men and women is largely attributable to past differences in tobacco smoking rates.[3]
- Pan-Canadian comparisons reveal that B.C. was projected to experience the lowest age-standardized lung cancer incidence rate for males (53.6 for 2023 compared to 60.1 for Canada excluding Quebec). Rates were highest in Atlantic Canada, ranging from 72.7 in NL to 81.7 per 100,000 in NS.[4]
- B.C. was projected to experience the second lowest age-standardized lung cancer incidence rates for females (56.8 per 100,000) for 2023. Only Ontario was lower with a rate of 55.0 per 100,000. Rates once again were highest in Atlantic Canada, ranging from 64.4 in P.E.I. to 75.4 per 100,000 in Nova Scotia. The Canadian average, excluding Quebec, was 58.4 per 100,000.
- B.C. was projected to experience the lowest age-standardized lung cancer mortality rates for both males (38.8 versus a Canadian average of 48.2 per 100,000) and females (31.8 versus a Canadian average of 36.9 per 100,000) in 2023.
- The recent introduction of an organized lung cancer screening program in 2022 in B.C. may serve to further decrease mortality from lung cancer, as earlier detection increases the probability of survival.[5]

- Although lung cancer incidence rates have generally declined in B.C. over the past decades, lung cancer remains a significant public health issue that is responsible for more than 2,200 deaths in B.C. annually and represents the highest cause of cancer death in the population.
- A continuing focus on primary prevention, and tobacco and vaping avoidance and cessation, will contribute to further decreases in future lung cancer incidence rates.[6]

Table 6-1 Lung cancer prevalence 2022

Year	Limited Duration (years)	Prevalence count
2022	0 to 1	2,158
2022	>1 to 5	4,355
2022	>5 to 10	2,049
2022	>10 to 20	1,297

Notes: Prevalence reported as of January 1, 2022.

Limited duration (years) refers to the time since a cancer diagnosis, categorized to show the prevalence of cancer by years since diagnosis.

Figure 6-1 Lung cancer prevalence trend – annual prevalence counts by years since diagnosis

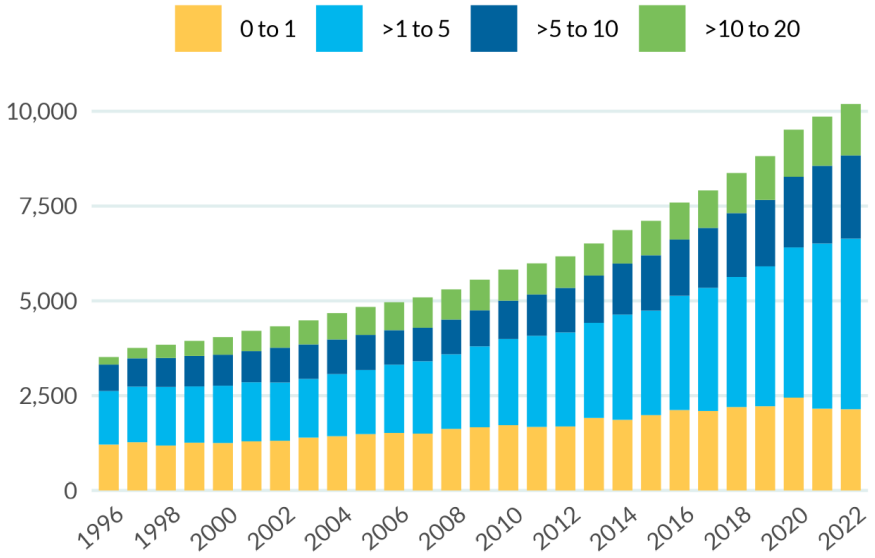


Table 6-2 Lung cancer incidence 2021

Year	Sex	Incidence count	Age-std incidence rate (ASIR, per 100,000)
2021	F	1,855	52.1
2021	M	1,745	55.8

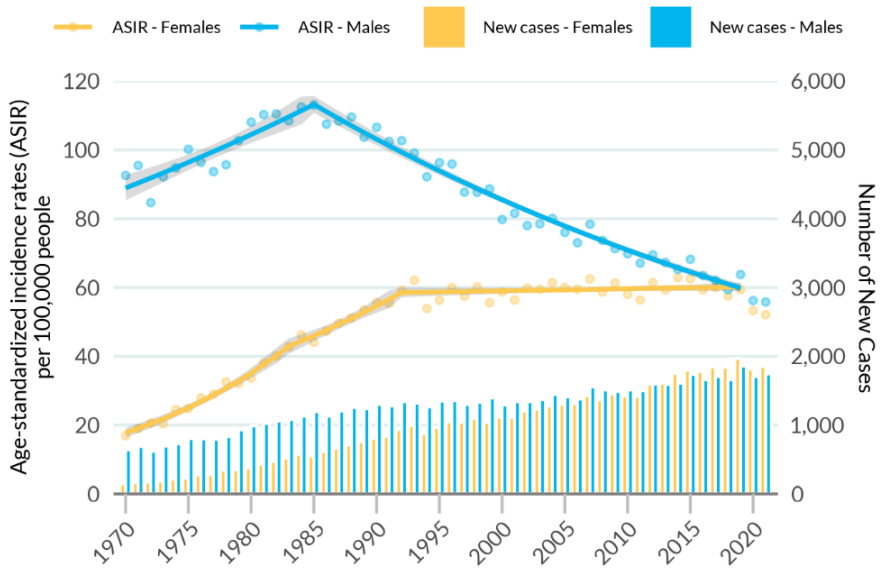
Note: Standardized to 2011 Canadian Standard Population (Statistics Canada 2011 census)

Table 6-3 Lung cancer mortality 2021

Year	Sex	Mortality count	Age-std mortality rate (ASMR, per 100,000)
2021	F	1,150	31.5
2021	M	1,190	37.9

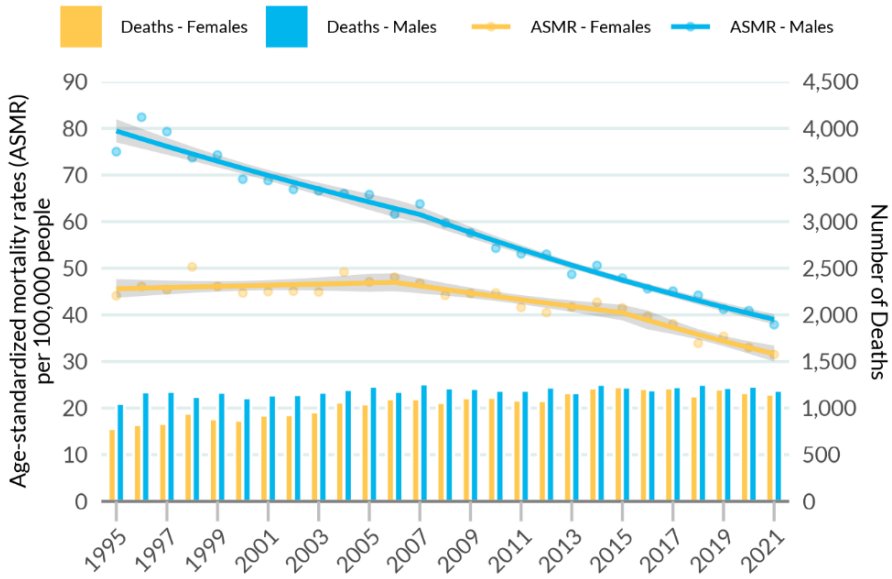
Note: Standardized to 2011 Canadian Standard Population (Statistics Canada 2011 census)

Figure 6-2 Lung cancer incidence trend



Note: The shaded grey area represents the 95% confidence interval for the data.

Figure 6-3 Lung cancer mortality trend



Note: The shaded grey area represents the 95% confidence interval for the data.

Survival

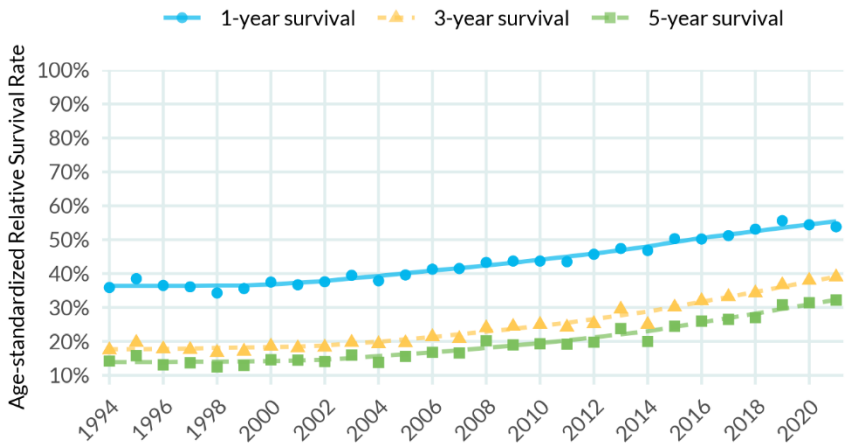
- Relative survival compares survival rates in those with lung cancer with those without lung cancer. It is also referred to as net survival.
- Lung cancer survival rates have been increasing since the early 2000s.
- Data from 2021 reveals that on average, those with lung cancer were 54% as likely to survive the first year after diagnosis relative to the general age-standardized population (compared to 37% in 1994). Persons ever diagnosed with lung cancer were 32% as likely to survive the first five years after diagnosis relative to the general age-standardized population (compared to 15% in 1994).
- In national analyses, the predicted five-year survival for B.C. (21%) was slightly lower than the Canadian average of 22%. The highest predicted five-year survival was estimated for Ontario (24%) and Newfoundland (23%).
- Lung cancer remains associated with poor outcomes relative to the other commonly diagnosed cancers in B.C.[7] Lung cancer survival, however, has improved over time as a result of improved treatment options.[8]
- The launch of the BC Cancer Lung Screening Program in 2022 may further improve lung cancer survival by enabling earlier disease detection.

Table 6-4 Lung cancer survival rate 2021

Year	Survival time	Age-standardized relative survival rate (%)
2021	1-year	53.8
2021	3-year	39.0
2021	5-year	32.2

Note: Standardized to 2011 Canadian Standard Population (Statistics Canada 2011 census)

Figure 6-4 Lung cancer survival trend



Screening

Lung Screening

Overview of the BC Cancer Lung Screening Program Launch

- On May 25, 2022, B.C. became the first province in Canada to launch a province-wide lung cancer screening program for eligible high-risk individuals aged 55-74 years. All Health Authorities were fully onboarded by November 2022, and there is ongoing work to enroll new sites.
- Participants can be physician- or self-referred. A risk prediction model that assesses a variety of risk factors was used to determine screening eligibility.
- During the first 18 months of roll-out, the BC Cancer Lung Screening Program assessed nearly 15,000 people. Of these, 10,400 (69%) were referred for Low-Dose Computed Tomography (LDCT), and 8,700 participants (84%) were screened. The number of screened individuals was lower than planned due to insufficient CT scanning capacity. Work is underway to increase LDCT scanning capacity provincially.
- To optimize the screening pathway, the Program introduced an artificial intelligence CT reading and risk prediction tool to triage lower risk individuals for biennial (instead of annual) screening frequency. 69% of participants screened were recommended for a biennial screen.
- A lung cancer detection rate of 16.3 per 1,000 participants screened was observed during this time with a positive predictive value of 47%.
- 74% of the lung cancers detected were early stage (stage I/II); 26% were stage III or IV. This is a significant shift to earlier stage detection: 2021 data, prior to the introduction of lung cancer screening, shows that 35% of diagnosed lung cancer cases were stage I or II. Stage shift is a strong indicator of future reduction of lung cancer mortality.[9]
- An age-based, non-risk-based model screening program generally has a cancer detection rate of 5-8 cases per 1000 participants screened. The B.C. Lung Screening Program diagnosed twice the rate of early-stage lung cancer, thereby allowing for more options for treatment with curative intent.

Table 6-5 Cancer detection rate and stage distribution of screen detected lung cancers

BC Cancer Lung Screening Program	
Number screened	8,656
Number referred for diagnostic follow-up	300
Number of cancers	141
Cancer detection rate (per 1000)	16.3
Positive predictive value (PPV)	47%
Stage	
I/II	74%
III/IV	26%

Note: B.C. Program enrolled individuals with a 6-year lung cancer risk >1.5%.

Diagnosis

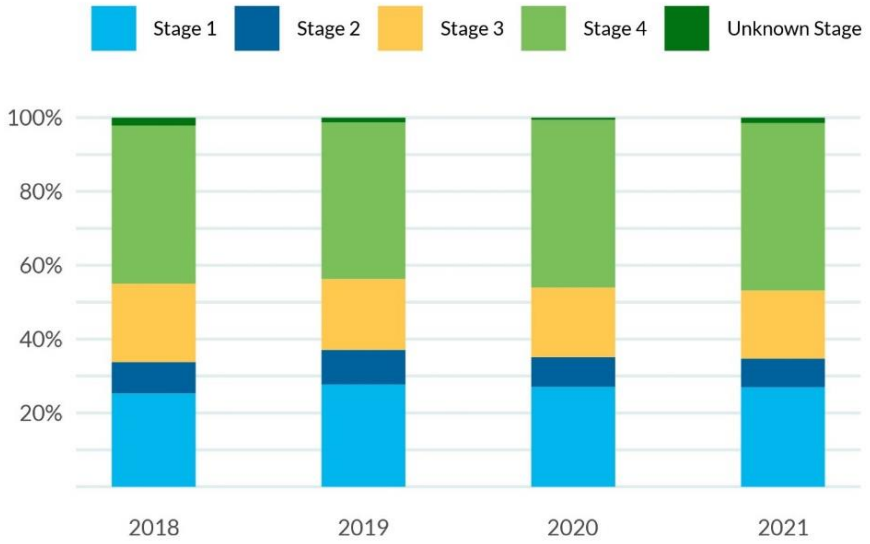
Stage at diagnosis

- Cancer staging is a method to classify cancer according to its extent and spread at the time of diagnosis. Cancer stage at diagnosis informs patient prognosis, treatment planning and treatment efficacy.
- The higher the stage, the more the cancer has spread. Stage I and II cancers are considered localized; stage III cancers are considered regional; and stage IV cancers are distant, where the cancer has spread to other parts of the body.
- Of all the five cancer disease sites presented in this report, lung cancer experienced the highest percentage of stage III and stage IV cases at diagnosis. In 2021, 64% of new lung cancer cases were diagnosed at either Stage III (18%) or Stage IV (45%).
- The distribution of new cancers diagnosed by stage value appears to be relatively consistent between 2018 (43% stage IV) and 2021 (45% stage IV).
- Stage at diagnosis has remained relatively stable among provinces. In 2018, 45.8% of lung cancer cases in Ontario were diagnosed at stage IV, similar to B.C.'s range of 43-46% between 2018 and 2021.[10]
- The Lung Cancer Screening Program, launched in 2022 (the first province-wide lung cancer screening program in Canada), holds promise to shift lung cancer diagnosis to earlier stages for eligible individuals with the ultimate goal of reducing mortality.

Table 6-6 Lung cancer stage at diagnosis by year

Year	Stage 1 (%)	Stage 2 (%)	Stage 3 (%)	Stage 4 (%)	Unknown (%)
2018	25.3	8.5	21.3	42.8	2.1
2019	27.7	9.5	19.2	42.4	1.3
2020	27.1	8.1	18.8	45.5	0.6
2021	26.9	7.8	18.4	45.4	1.5

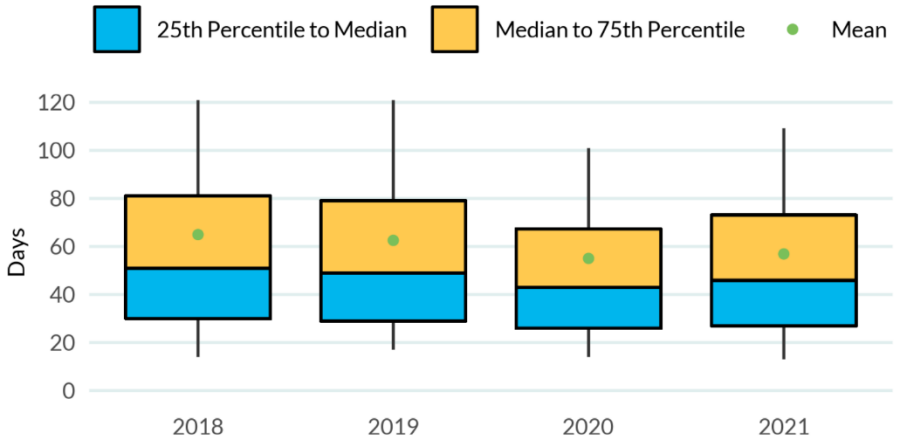
Figure 6-5 Lung cancer stage at diagnosis by year



Time from diagnosis to first non-surgical treatment

- Wait time measures are important from both a clinical and patient perspective. Excessive wait time can lead to disease progression and poorer prognosis. Long wait times can also negatively affect a patient's well-being.
- This indicator measures the time from diagnosis to first treatment for non-surgical lung cancer patients.
- In 2021, the median time from lung cancer diagnosis to first treatment (where first treatment was not surgery) was 46 days, an improvement from 51 days in 2018. Also, in 2021, 75% of cases commenced treatment within 73 days.
- In 2021 the median time from diagnosis to first treatment for stage 4 was 38 days, and stage 3 was 50 days. Stage 1 lung cancer cases experienced relatively longer wait times at 85 days.
- Cancer UK has recommended an ideal wait time of less than one month from diagnosis to first treatment but has recommended start of treatment within two months as a more realistic target.[1]
- Australia has recommended that any treatment for lung cancer begin within six weeks of the initial specialist referral.[11]
- In a 2018 systematic review of 52 studies, the median time from diagnosis to first treatment was 27 days. A lack of symptoms and multiple procedures or specialist visits were suggested causes for delay.[12]
- In B.C., 50% of lung cancer cases in 2021 (where first treatment was not surgery) commenced treatment within 46 days, and 75% within 73 days.
- Time from diagnosis to treatment in B.C. for higher stage disease is clinically acceptable and consistent with wait times seen in other jurisdictions. Time to treatment for early-stage disease is longer than what has been reported elsewhere. However, in B.C. this measure is only for patients receiving non-surgical treatment for early-stage lung cancer. A lack of symptoms, more slow growing cancers and an older more frail patient population who are not suitable for surgery may be factors contributing to a longer time to treatment. However, these results indicate that there is room for improvement.

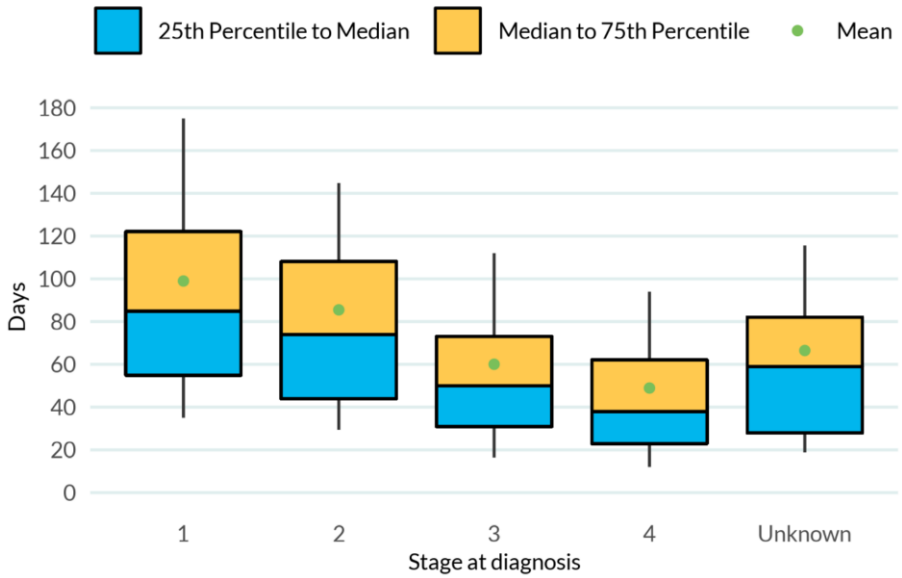
Figure 6-6 Time from diagnosis to first treatment by year



Notes: Range is the 10th to 90th percentiles

Data table included in the Technical Supplement.

Figure 6-7 Time from diagnosis to first treatment by stage 2021



Notes: Range is the 10th to 90th percentiles

Data table included in the Technical Supplement.

Treatment

Unplanned readmissions and emergency department visits within 30 days of discharge from hospital post-surgery

- Unplanned Emergency Department (ED) visits and hospital readmissions post-surgery are associated with increased patient risk, patient discontent and increased resource utilization.
- Readmission after lung cancer surgery has been associated with poorer patient outcomes and a significant increase in mortality.[13]
- Common reasons for revisiting the hospital within 30 days of lung cancer surgery include pain, shortness of breath, wound issues and pulmonary infection.[13]
- While some of these visits may be unavoidable, others may be preventable.
- Hospital readmission rates within 30 days of lung cancer surgery decreased from 7% in 2018 to 5% in 2023.
- Unplanned ED visit rates hovered between 15% and 17% during this time.
- Unplanned ED visit rates were substantially lower in B.C. (16% in 2019) relative to ON (23%).[10] Unplanned readmission rates were similar (6% in B.C. and 6% in Ontario in 2019).
- A multicentre review of 30-day unplanned readmission rates following lung cancer surgery by the UK Thoracic Surgery Group found readmission rates at 11%. Causes of readmission were mostly pulmonary related.[14] Factors associated with readmission included being discharged with a pleural drain, having 2 or more complications, and patients' readiness for discharge.[4]
- A prospective cohort study from Ontario found that unplanned ED rates decreased with improved patient follow-up post-discharge (from 39% to 24%). The study also found similar unplanned readmission rates pre- and post-intervention (10-12%), concluding that many unplanned readmissions are unavoidable and may be secondary to pre-existing comorbidities, surgical complexity and perioperative complications.[13]
- While unplanned ED visits following lung cancer surgery in B.C. are relatively infrequent, efforts should be made to ensure optimization of patients' clinical status and have necessary supports in place prior to discharge.

Table 6-7 Unplanned emergency department visits or readmissions within 30 days of discharge from hospital post-surgery

Year	Patients who had surgeries (N)	Unplanned emergency department visits (%)	Readmissions (%)
2018	841	15.5	6.7
2019	956	15.9	6.2
2020	941	16.2	5.3
2021	903	17.1	6.0
2022	923	14.6	4.9
2023	827	15.1	4.8

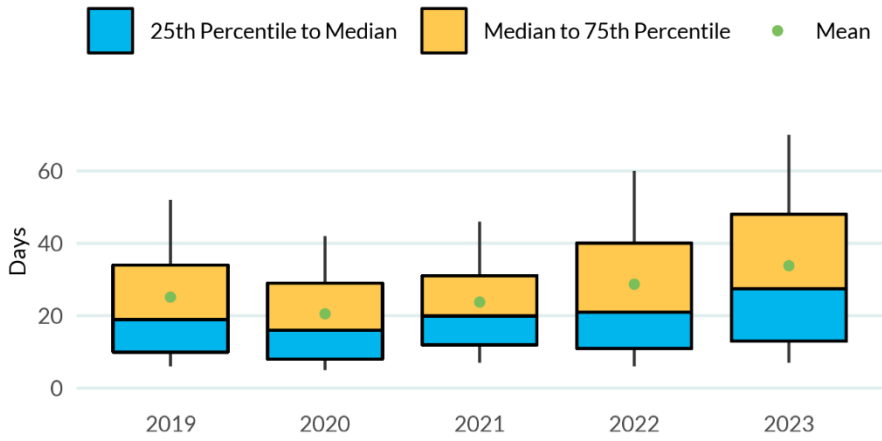
Time from booking form received to surgery

- The wait for surgery represents a component of the total waiting time for surgery, from the date the health authority receives the booking form to the date that the patient receives surgery. The booking date is the date at which both the patient and the surgeon agree to proceed, and the patient is ready to receive the surgery.
- The median time from booking form received to surgery was 27.5 days in 2023, an increase from 19 days in 2019.
- During the COVID-19 pandemic, most non-urgent surgeries in Canada were postponed, increasing capacity for urgent services like cancer surgery and reducing wait times. As normal services resumed, lung cancer surgery wait times in B.C. have gradually increased, now surpassing pre-COVID levels.[15,16]
- The B.C. Ministry sets targets for wait times in the province. Lung cancer surgery has the highest level of priority with a wait for surgery target of 'within 2 weeks.'
- In 2020, B.C. was among the top three provinces with lowest lung cancer surgery wait times; B.C.'s median wait was 15 days compared to Canada's 20 days. Since then, wait times have increased, and in 2023, B.C.'s median of 28 days is higher than Canada's 26 days.[17]
- Variations in surgical wait times among sites may indicate significant disparities in resources; B.C. thoracic surgery sites will review hospital-specific data to identify deficiencies and advocate for improved resource and staffing allocation.

Table 6-8 Time from booking form received to surgery by year

Year	P25 (days)	P50 (days)	P75 (days)	Mean
2019	10	19	34	25.13
2020	8	16	29	20.53
2021	12	20	31	23.77
2022	11	21	40	28.70
2023	13	27.5	48	33.82

Figure 6-8 Time from booking form received to surgery by year



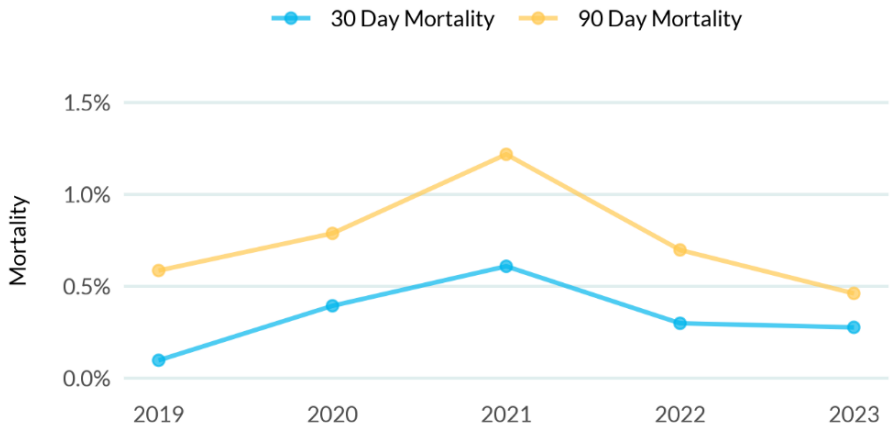
30-Day and 90-Day Post-Surgery Mortality

- 30-day mortality has been a common measure used for thoracic cancer surgery providing a measure of this risk. There is growing evidence that 90-day mortality after a lung resection might be more reflective of the risk involved, with nearly double additional mortality attributable to the surgery.[18]
- In 2023, the 30- and 90-day post-surgery mortality rates in B.C. were 0.28% and 0.46%, respectively.
- For lung cancer resections, B.C. thoracic surgery sites have amongst the lowest postoperative mortality rates in Canada. In 2019, the 30- and 90-day post-surgery mortality rates in Ontario were 0.8% and 2.8%, respectively, [10] while in B.C., the 30- and 90-day post-surgery mortality rates were lower at 0.10% and 0.59%.
- Evidence reveals an inverse relationship between hospital volume and short-term mortality for lung cancer. In B.C., lung cancer surgery has been regionalized with only 4 facilities across the province performing thoracic surgery. High volume facilities utilize specialized teams of thoracic surgeons, anesthesiologists, nurses and allied health professionals to provide thoracic patient care. Tertiary care, high volume sites provide ready access to intensive care, radiology and other subspecialty services with increased resources to deal with high-risk thoracic surgery patients compared to non-regionalized infrastructures.[19,20]
- Regionalization of the thoracic cancer surgery program in B.C. has been a vital factor to provide safe, effective care for lung cancer patients.

Table 6-9 30-day and 90-day post-surgery mortality by year

Year	Volume	30-day mortality (N)	90-day mortality (N)	30-day mortality rate (%)	90-day mortality rate (%)
2019	1,024	1	6	0.10	0.59
2020	1,015	4	8	0.39	0.79
2021	985	6	12	0.61	1.22
2022	1,003	3	7	0.30	0.70
2023	1,083	3	5	0.28	0.46

Figure 6-9 30-day and 90-day post-surgery mortality rate by year



Limited-Stage Small Cell Lung Cancer (LS-SCLC) patients who received chemoradiation

- Combined modality therapy (i.e. radiation therapy to the chest combined with chemotherapy) has been recommended by the BC Cancer Lung Tumour Group as it has been shown to increase median survival to 18-24 months (from 5-6 months with radiotherapy alone) and the probability of long-term (5-year) survival to 20-25%.[21]
- The percentage of LS-SCLC patients who received chemoradiation, ranged from 40-57% between 2018 and 2021.
- B.C. percentages are lower than those for Ontario (58-66% between 2014-2018) [10] and Calgary (62% between 2010-2016 at a tertiary care centre).[22]
- NHS Scotland has set a target of 70% of patients with LS-SCLC to receive platinum-based chemotherapy and (concurrent or specialist) radiotherapy. In 2021, 75% of eligible patients in Scotland had received this care.[23] NHS Scotland notes that due to comorbidities, not all patients are suitable for chemotherapy, and due to clinical presentation, not all patients are candidates for radiotherapy.[24]
- The rate of chemoradiotherapy for LS-SCLC will improve with the implementation of lung screening programs. Patients will be identified earlier in their disease course with fewer symptoms from their cancer, enabling delivery of appropriate cancer care.

Table 6-10 Limited-stage SCLC patients who received chemoradiation

Year	Total Limited stage SCLC patients (N)	Chemoradiation (N)	Chemoradiation (%)
2018	76	43	56.6
2019	101	48	47.5
2020	80	41	51.3
2021	58	23	39.7

Stage 2 Non-Small Cell Lung Cancer (NSCLC) patients who received a post-surgery medical oncology consultation

- Past evidence showed that patients with completely resected stage 2 lung cancer can experience improved quality of life and increased survival from adjuvant platinum-based chemotherapy regimens.[25]
- More recent evidence, however, has emerged suggesting greater choice in neoadjuvant, adjuvant and peri-operative treatment for patients with resectable NSCLC.[26,27]
- This indicator measures the percentage of patients who received a post-surgery medical oncology consultation to consider the benefits and risks of various post-surgery systemic treatment options.
- In 2021, 73% of B.C. NSCLC patients received a post-surgery medical oncology consultation.
- In 2018, Ontario's medical oncology consultation rate for post-surgery NSCLC patients was 80%, similar to B.C.'s rate of 76%.[10]
- With advances in peri-operative chemotherapy and immunotherapy strategies to improve outcomes BC Cancer anticipates an increase in the proportion of Stage 2 patients referred to medical oncology.

Table 6-11 Stage 2 NSCLC patients who received a post-surgery medical oncology consultation

Year	Stage 2 NSCLC patients who had surgery (N)	Medical oncology consultation (N)	Medical oncology consultation (%)
2018	118	90	76.3
2019	163	118	72.4
2020	117	84	71.8
2021	128	94	73.4

Stage 3 Non-Small Cell Lung Cancer (NSCLC) patients who received immunotherapy following chemoradiation

- Durvalumab (immunotherapy) after chemotherapy and radiation for stage 3 NSCLC has been associated with a survival advantage. An international multi-centre trial, PACIFIC, concluded that patients receiving immunotherapy (durvalumab) after chemoradiation experienced improved progression-free survival and overall survival.[28]
- In 2021, 68% of stage 3 NSCLC received immunotherapy after chemoradiation in B.C. Rates have increased since 2018, when Durvalumab was approved in Canada.
- In its report,[10] Ontario noted adopting this practice soon after results from the PACIFIC trial were released. As such, the Ontario data shows a steady increase in the adoption rate from 0% in 2014 to 63% in 2019.
- The rapid uptake of durvalumab for Stage 3 NSCLC patients (%) after chemoradiotherapy demonstrates the provincial commitment to promote adoption of new beneficial therapies.

Table 6-12 Stage 3 NSCLC patients who received immunotherapy following chemoradiation

Year	Total Stage 3 NSCLC patients who received chemoradiation (N)	Immunotherapy received after chemo-radiation (N)	Immunotherapy after chemo-radiation (%)
2018	88	8	9.1
2019	93	56	60.2
2020	87	54	62.1
2021	62	42	67.7

Chapter End Notes

[1] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023. p. 6.

[2] Ebrahimi H, Aryan Z, Moghaddam SS, Bisignano C, Rezaei S, Pishgar F, Force LM, Abolhassani H, Abu-Gharbieh E, Advani SM, Ahmad S. Global, regional, and national burden of respiratory tract cancers and associated risk factors from 1990 to 2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet Respir Med. 2021 Sep 1;9(9):1030-49.

[3] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023. p. 21.

[4] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023. p. 29.

[5] Government of British Columbia. CancerPlan2023 [Internet]. Victoria, BC: Government of British Columbia. Available from: https://www.gov.bc.ca/CancerPlan2023.pdf. p. 15.

[6] Government of British Columbia. CancerPlan2023 [Internet]. Victoria, BC: Government of British Columbia. Available from: https://www.gov.bc.ca/CancerPlan2023.pdf. p. 32.

[7] Government of British Columbia. CancerPlan2023 [Internet]. Victoria, BC: Government of British Columbia. Available from: https://www.gov.bc.ca/CancerPlan2023.pdf. p. 14.

[8] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023. p. 66.

[9] Feng X, Zahed H, Onwuka J, Callister ME, Johansson M, Etzioni R, Robbins HA. Cancer stage compared with mortality as end points in randomized clinical trials of cancer screening: a systematic review and meta-analysis. JAMA. 2024 Apr 7.

[10] Chaudhry M, Kandasamy S, Habbous S, Chan C, Barisic A, Faisal A, Walker M, Haque M, Sheppard A, Uri E, Ashu E, Schwartz N, Young S, McCurdy B. Cancer System Quality Index Report 2021. Ontario: Ontario Health; 2021. Available from: https://www.ontariohealth.ca/sites/ontariohealth/files/csqi-report-2021.pdf

[11] Cancer Council Victoria, Department of Health Victoria. Optimal care pathway for people with lung cancer. 2nd ed. Melbourne: Cancer Council Victoria; 2021.

[12] Malalasekera A, Nahm S, Blinman PL, et al. How long is too long? A scoping review of health system delays in lung cancer. Eur Respir Rev. 2018;27:180045. Available from: https://doi.org/10.1183/16000617.0045-2018.

[13] Minervini F, Taylor J, Hanna WC, Agzarian J, Hughes K, Pinkney P, Lopez-Hernandez Y, Coret M, Schneider L, Finley C, Rushton J. Can a mobile app technology reduce emergency department visits and readmissions after lung resection? A prospective cohort study. Can J Surg. 2022 Nov;65(6):E798. Available from: https://www.canjsurg.ca/content/cjs/65/6/E798.full.pdf

[14] King M, Kerr A, Dixon S, Taylor S, Smith A, Merriman C, Mitchell J, Canavan J, Hunter V. Multicentre review of readmission rates within 30 days of discharge following lung cancer surgery. Br J Nurs. 2019 Sep 26;28(17):S16-22. doi: 10.12968/bjon.2019.28.17.S16.

[15] Reason B, Pichora E, Johnson T. How were wait times for priority procedures in Canada impacted during the first six months of the COVID-19 pandemic?. Toronto: Healthcare Quarterly. 2022 Jan 1;24(4):11-5.

[16] Shojaei D, Bakos B, Loree J, et al. Impact of the COVID-19 Pandemic on Access to Cancer Surgery: Analysis of Surgical Wait Times in British Columbia, Canada. Disaster Med Public Health Prep. 2023;17. doi:10.1017/dmp.2023.223.

[17] CIHI. Explore wait times for priority procedures across Canada. [Internet]. Ottawa: CIHI. Available from: https://www.cihi.ca/en/explore-wait-times-for-priority-procedures-across-canada

[18] McMillan RR, Berger A, Sima CS, Lou F, Dycoco J, Rusch V, et al. Thirty-day mortality underestimates the risk of early death after major resections for thoracic malignancies. Ann Thorac Surg. 2014 Nov 1;98(5):1769-75.

[19] Canadian Partnership Against Cancer. Pan-Canadian Standards for Thoracic Surgery. Toronto: CPAC; 2018 Mar. Available from: https://s22457.pcdn.co/wp-content/uploads/2019/01/Pan-Canadian-Standards-Thoracic-Surgery-EN.pdf

[20] Finley C, Schneider L, Shakeel S. Approaches To High-Risk, Resource Intensive Cancer Surgical Care In Canada. Toronto: CPAC; 2015. Available from: https://www.partnershipagainstcancer.ca/wp-content/uploads/2019/01/High-Risk-Resource-Surgical-Care-EN.pdf

[21] BC Cancer. Limited Stage Disease. [Internet]. Vancouver: BC Cancer; 2014 Jan. Available from: http://www.bccancer.bc.ca/books/lung/management/small-cell-lung-cancer/limited-stage-disease

[22] Elegbede AA, Gibson AJ, Fu H, Dean ML, Ezeife DA, Lau H, Cheung WY, Bebb DG. Real-World Adherence to Guideline-Recommended Treatment for Small Cell Lung Cancer. Am J Clin Oncol. 2020 Apr;43(4):236-242. doi: 10.1097/COC.0000000000000657.

[23] NHS Scotland. Lung Cancer Quality Performance Indicators: Patients diagnosed from January 2019 to December 2021. Public Health Scotland; 2023 Feb 28. Available from: https://www.publichealthscotland.scot/publications/lung-cancer-quality-performance-indicators/lung-cancer-quality-performance-indicators-patients-diagnosed-between-january-2019-to-december-2021/

[24] NHS Scotland. Lung Cancer: Clinical Quality Performance Indicators. v4.1. Health Improvement Scotland; 2012 Dec. Updated 2021 Sep. Available from: https://www.healthcareimprovementscotland.scot/wp-content/uploads/2024/06/CQPI-Lung-Cancer.pdf

[25] Pisters K, Kris MG, Gaspar LE, Ismaila N, Adjuvant Systemic Therapy and Adjuvant Radiation Therapy for Stage I to IIIA NSCLC Guideline Expert Panel. Adjuvant systemic therapy and adjuvant radiation therapy for stage I-IIIA completely resected non-small-cell lung cancer: ASCO Guideline Rapid Recommendation Update. J Clin Oncol. 2022 Apr 1;40(10):1127-9.

[26] Forde PM, Spicer J, Lu S, Provencio M, Mitsudomi T, Awad MM, Felip E, Broderick SR, Brahmer JR, Swanson SJ, et al. Neoadjuvant Nivolumab plus Chemotherapy in Resectable Lung Cancer. N Engl J Med. 2022 May 26;386(21):1973-1985. doi: 10.1056/NEJMoa2202170.

[27] Wakelee H, Liberman M, Kato T, Tsuboi M, Lee SH, Gao S, Chen KN, Dooms C, Majem M, Eigendorff E, Martinengo GL, Bylicki O, Rodríguez-Abreu D, Chaft JE, Novello S, Yang J, Keller SM, Samkari A, Spicer JD; KEYNOTE-671 Investigators. Perioperative Pembrolizumab for Early-Stage Non-Small-Cell Lung Cancer. N Engl J Med. 2023 Aug 10;389(6):491-503. doi: 10.1056/NEJMoa2302983.

[28] Spigel DR, Faivre-Finn C, Gray JE, Vicente D, Planchard D, Paz-Ares L, Vansteenkiste JF, Garassino MC, Hui R, Quantin X, Rimner A. Five-year survival outcomes from the PACIFIC trial: durvalumab after chemoradiotherapy in stage III non–small-cell lung cancer. J Clin Oncol. 2022 Apr 20;40(12):1301-11.

Chapter 7: Prostate Cancer

Prostate Cancer Summary

Prostate cancer is the most frequently diagnosed cancer among males in Canada. Prostate cancer is characterized by both high incidence and high survival rates which some studies have in part attributed to over-diagnosis.

In 2021, there were 730 deaths at a rate of 24.2 per 100,000 population. At the start of 2022, 39,400 individuals ever diagnosed with prostate cancer were alive in B.C., more than double the number in 1996.

Survival rates remain high and have been stable over time. Data from 2021 reveals that on average, individuals with prostate cancer were 97% as likely to survive the first year after diagnosis relative to the general age-standardized population.

Despite these improvements over time, prostate cancer remains a significant cause of cancer mortality and morbidity.

Areas where B.C. is performing well include:

- *Age-standardized incidence rates* - B.C.'s rates are marginally higher than for most other provinces but lower than the Canadian average (119.1 per 100,000).
- *Unplanned hospital readmission and emergency department visits within 30 days of discharge from hospital post-surgery* - Between 2018 and 2023, hospital readmission rates in B.C. ranged from 4% to 5.5%, while unplanned ED visits decreased from 29% to 22%. Despite higher ED visit rates compared to a meta-analysis, this indicator is performing well as both readmission and ED visit rates have been declining.
- *Low-risk patients who received no treatment* - In 2021, 90% of low-risk patients in B.C. received no treatment, up from 84% in 2018. B.C. was found to be comparable to Ontario in minimizing overtreatment for low-risk prostate cancer patients and has shown a positive trend in further reducing overtreatment.
- *High-risk patients who received Androgen Deprivation Therapy (ADT) while undergoing radiotherapy* - In B.C., 87-89% of high-risk prostate cancer patients received combination ADT and radiation therapy from 2018 to 2021, on par with other jurisdictions. This combination remains the standard of care, and B.C. consistently maintains a high proportion of patients on this treatment.

Areas with room for improvement include:

- *Positive Margins Following Radical (or Total) Prostatectomy: pT2 and pT3* - The positive margin rate in B.C. for radical prostatectomy is 21-28% for pT2 and 49-54% for pT3 cancer, which affects cancer recurrence and must be balanced against preserving urinary and erectile functions. B.C. has room for improvement compared to Ontario's targets of 20% for pT2 and 40% for pT3.
- *New metastatic Castration-Sensitive Prostate Cancer (mCSPC) patients who received Androgen Deprivation Therapy (ADT) with concurrent Androgen Receptor Axis-Targeted Therapies (ARAT)* - In B.C., 7% of mCSPC patients received ADT concurrently with ARAT between 2018 and 2020; the rate spiked to 31% in 2021. Early intensification with an ARAT is standard of care in the mCSPC setting. B.C.'s results for 2021 are comparable to other provinces, but there is room for significant improvement.

- *Low-risk prostate cancer patients who received a nuclear bone scan after diagnosis* - Guidelines do not recommend bone scans for very low- or low-risk localized prostate cancer patients due to the rarity of recurrence and metastases, as well as the cost and potential delays associated with further investigations. In B.C., the percentage of low-risk prostate cancer patients receiving a bone scan within six months of diagnosis decreased from 8.7% in 2018 to 7.6% in 2021. This rate is comparable to Ontario's, but there is still room for improvement.

This chapter also presents the following indicators, for which no assessment of performance has been made:

- Age-standardized mortality rate
- Relative survival rates
- Stage at diagnosis
- Time from diagnosis to first treatment

Data Sources

The main data source used in this section was the BC Cancer Registry, which at the time of this analysis included all cases of cancer among BC residents to the end of 2021. Indicators in this section are supported by linkage of the BC Cancer Registry to other health services data including the Surgical Patient Registry, the BC Cancer Pharmacy and Radiotherapy databases, the Discharge Abstract Database, and CASCADE screening information system. At the time of analysis these additional data sources typically had health service follow-up data available to the end of 2023. More details on data sources can be found in the accompanying technical appendix for this report.

Cancer Burden

Incidence, mortality and prevalence

- Prostate cancer is the most frequently diagnosed cancer for males in Canada.[1]
- Age-standardized prostate cancer incidence rates in B.C. peaked in the 1990s at 190 per 100,000 population. This trend has been attributed to the intense use of prostate-specific antigen (PSA) testing in Canada during that time.[2]
- More stringent PSA screening guidelines in numerous countries, including Canada, led to the decline in incidence observed since the mid-1990s to today. In 2021, 3,560 individuals were diagnosed with prostate cancer, representing an age-standardized incidence rate of 111.5 per 100,000 population.
- Age-standardized prostate cancer mortality rates also steadily declined since the 1990s. In 2021, 730 individuals in B.C. died from prostate cancer, representing an age-standardized mortality rate of 24.2 per 100,000 population. This decline has been attributed to improvements in prostate cancer treatment strategies over this time.[3]
- The prevalence of British Columbians ever diagnosed with prostate cancer has increased. At the start of 2022, 39,400 individuals ever diagnosed with prostate cancer were alive in B.C., more than double the number in 1996.
- In 2022, 63% of these individuals had been diagnosed more than five years previously, compared to 30% of individuals in 1996.
- Pan-Canadian comparisons reveal that the projected 2023 age-standardized incidence rate for prostate cancer is marginally higher in B.C. than for most other provinces but lower than the Canadian average (119.1 per 100,000 population compared to 120.8 for Canada excluding Quebec). The lowest rates were in New Brunswick (114.1) and P.E.I. (114.8).[1]
- The age-standardized mortality rate for prostate cancer in B.C. was projected to be 25.0 per 100,000 population in 2023, compared to a Canadian average of 23.0. Five provinces were projected to have a rate lower than in B.C. (Alberta, Ontario, Quebec, New Brunswick and P.E.I., range 20.3 – 24.4).[4]
- The impact of PSA screening on declining mortality rates remains unclear.[3] Prostate cancer screening with PSA in asymptomatic individuals with no signs of prostate cancer is currently not recommended by the Canadian Task Force on Preventive Health Care, particularly due to the risk of over-diagnosing slow growing cancers which would not affect an individual during their lifetime.[5]
- Although both prostate cancer incidence and mortality rates have decreased from their peaks in the 1990's, prostate cancer remains a significant cause of cancer mortality and morbidity.

Table 7-1 Prostate cancer prevalence 2022

Year	Limited Duration (years)	Prevalence count
2022	0 to 1	3,188
2022	>1 to 5	11,431
2022	>5 to 10	10,752
2022	>10 to 20	14,040

Notes: Prevalence reported as of January 1, 2022.

Limited duration (years) refers to the time since a cancer diagnosis, categorized to show the prevalence of cancer by years since diagnosis.

Table 7-2 Prostate cancer incidence 2021

Year	Incidence count	Age-std incidence rate (ASIR, per 100,000)
2021	3,560	111.5

Note: Standardized to 2011 Canadian Standard Population (Statistics Canada 2011 census)

Figure 7-1 Prostate cancer annual prevalence counts by years since diagnosis

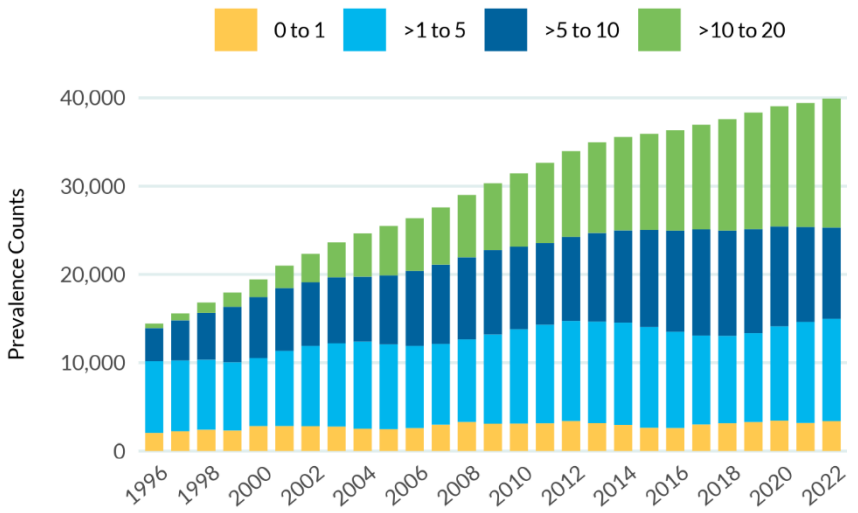
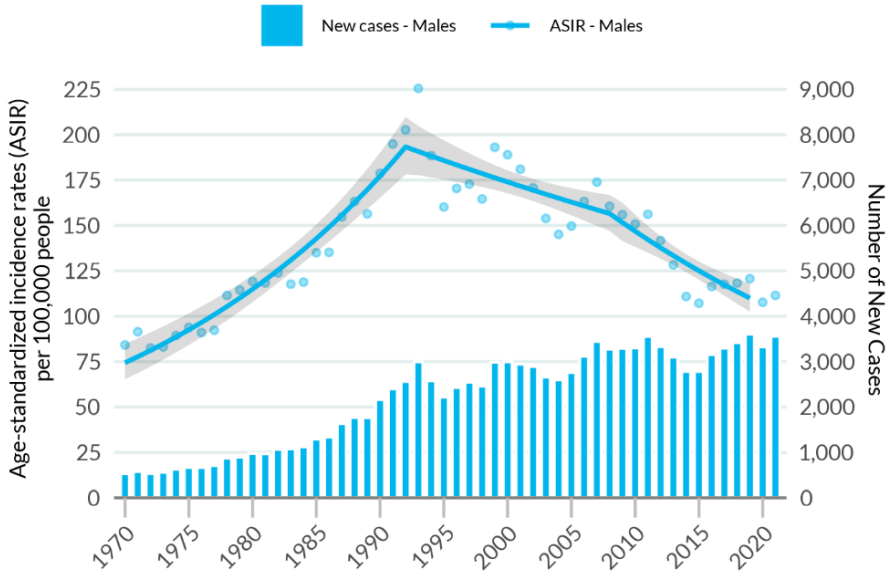


Figure 7-2 Prostate cancer incidence trend



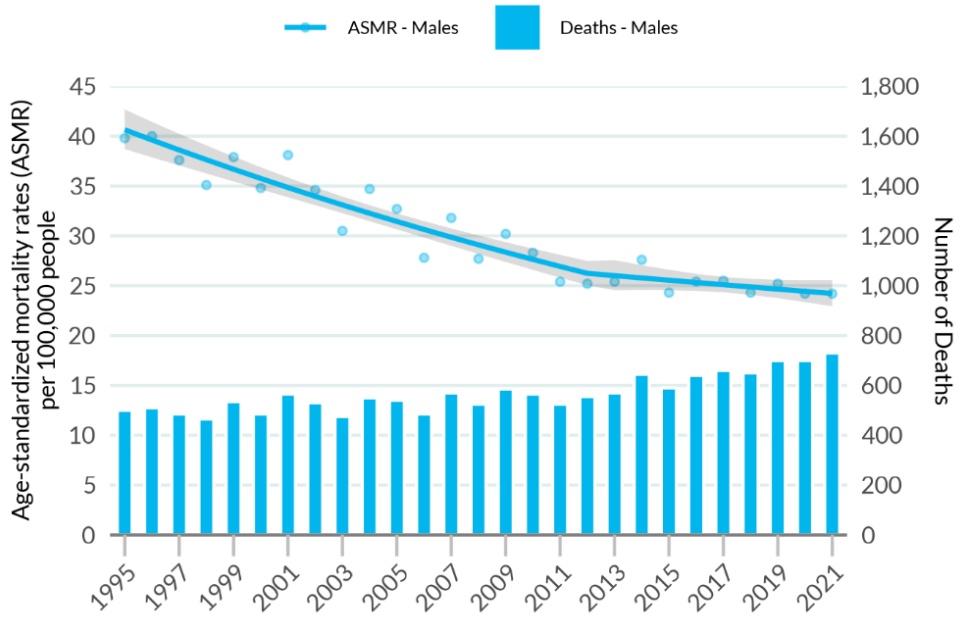
Note: The shaded grey area represents the 95% confidence interval for the data

Table 7-3 Prostate cancer mortality 2021

Year	Mortality count	Age-std mortality rate (ASMR, per 100,000)
2021	730	24.2

Note: Standardized to 2011 Canadian Standard Population (Statistics Canada 2011 census)

Figure 7-3 Prostate cancer mortality trend



Note: The shaded grey area represents the 95% confidence interval for the data

Survival

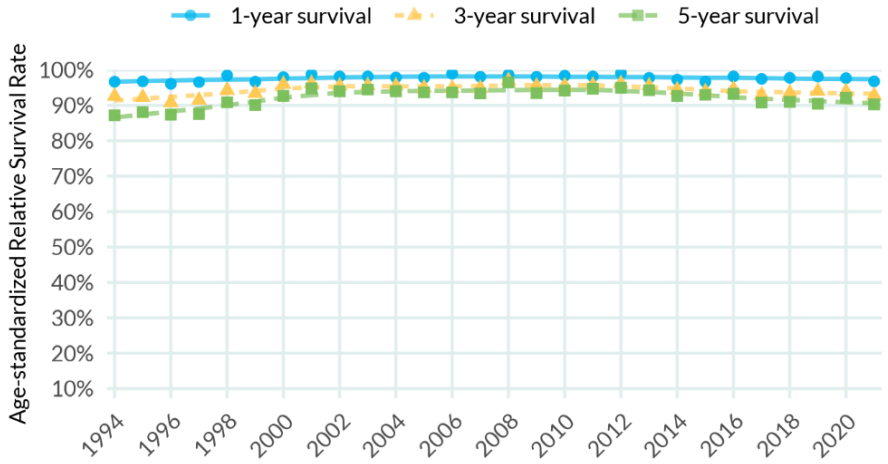
- Relative survival compares survival rates in those with prostate cancer to those without prostate cancer. It is also referred to as net survival.
- Prostate cancer survival rates remain high and have been stable over time. Data from 2021 reveals that on average, individuals with prostate cancer were 97% as likely to survive the first year after diagnosis relative to the general age-standardized population. Those ever diagnosed with prostate cancer were 90% as likely to survive the first five years after diagnosis relative to the general age-standardized population.
- The predicted five-year age-standardized relative survival rate for prostate cancer was similar in B.C. as the Canadian average, excluding Quebec (91 cases per 100,000 population). Saskatchewan was lowest at 86.
- Prostate cancer is characterized by both high incidence and high survival rates which some studies have in part attributed to over-diagnosis.[6]
- Clinical pathways and guidelines have been developed in B.C. to assist with appropriate testing guidelines to diagnose prostate cancer. This work will continue to be updated as the science related to the diagnosis and treatment of prostate cancer continues to evolve.[7]

Table 7-4 Prostate cancer survival rate 2021

Year	Survival time	Age-standardized relative survival rate (%)
2021	1-year	96.8
2021	3-year	92.8
2021	5-year	90.3

Note: Standardized to 2011 Canadian Standard Population (Statistics Canada 2011 census)

Figure 7-4 Prostate cancer survival trend



Diagnosis

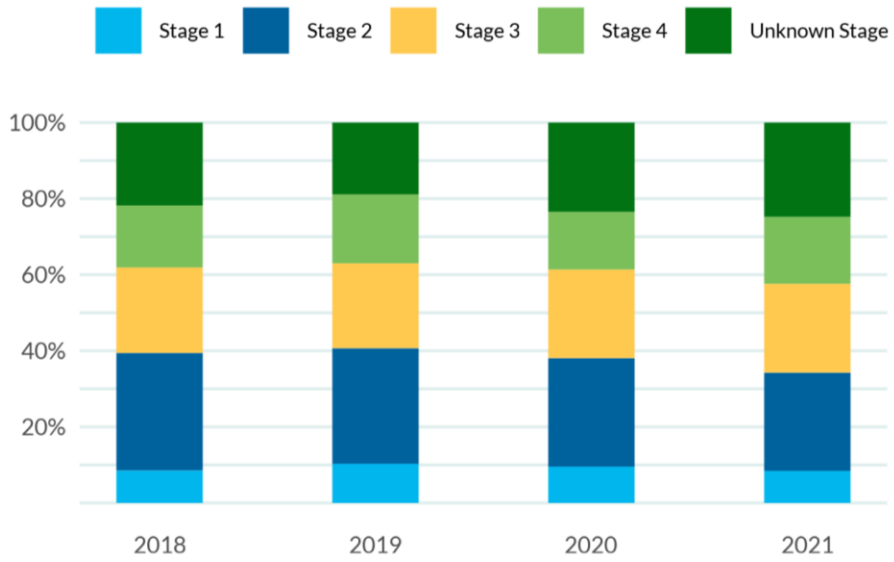
Stage at diagnosis

- Cancer staging is a method to classify cancer according to its extent and spread at the time of diagnosis. Cancer stage informs a patient's prognosis as well as their treatment options.
- Stage number is generally correlated with spread: in other words, the higher the stage number, the more the cancer has spread. Stage 1 and 2 cancers are considered localized; stage 3 cancers are considered regional; and stage 4 cancers are distant, where the cancer has spread to other parts of the body.
- Overall, the proportion of early stage vs. late-stage prostate cancer has remained steady between 2018 and 2021.
- In 2021, 8.4% of prostate cancer cases diagnosed were at stage 1 (similar to 8.5% in 2018).
- In 2021, 17.6% of prostate cancer cases were diagnosed at stage 4 compared with 16.3% in 2018.
- In general, the data is perceived to be relatively steady between 2018 and 2021. It is difficult to perceive significant trends due to the high percentage of cases (19-25%) with unknown stage.
- Unknown stage may be due to limited stage workup, limitations in documentation in the patient record, or incomplete data abstraction. The percentage of unknown stage varies across reports from different jurisdictions. This can be due as well to differences in the interpretation of guidelines to abstract staging information from the medical record. As of 2018, in alignment with national standards, the staging collection system transitioned to TNM eighth edition. The TNM stage system requires complete clinical or pathological information to determine an overall stage, which has resulted in more cases with missing or unknown stage information. Published reports of unknown stage in Canada vary from 9% in 2018 in Ontario[8] to 45% in 2020-2021 in Alberta.[9] Further efforts are needed to improve consistency and application of abstraction guidelines in Canada.
- Interpretation of this analysis is limited by the ability to collect the staging information for all patients undergoing prostate cancer diagnostic evaluation and limited conclusions can be made regarding the stage at diagnosis. However, over 5 years, it appears stable.

Table 7-5 Prostate cancer stage at diagnosis by year

Year	Stage 1 %	Stage 2 %	Stage 3 %	Stage 4 %	Unknown %
2018	8.5	30.9	22.5	16.3	21.8
2019	10.3	30.4	22.3	18.1	18.9
2020	9.5	28.5	23.3	15.2	23.5
2021	8.4	25.8	23.4	17.6	24.8

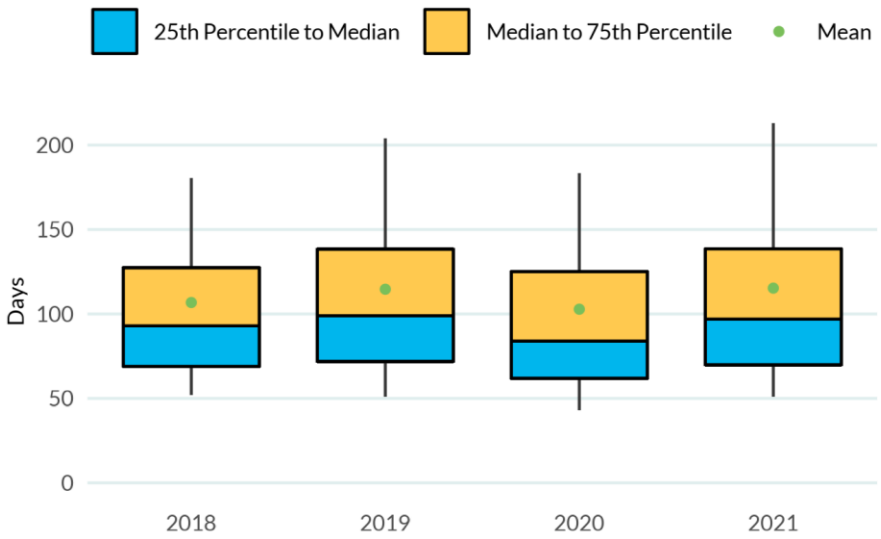
Figure 7-5 Prostate cancer stage at diagnosis by year



Time from diagnosis to first treatment

- Wait time measures are important from both a clinical and patient perspective. Excessive wait time can lead to disease progression and poorer prognosis. Long wait times can also negatively affect a patient's well-being.
- Due to the nature of prostate cancer, longer wait times may be expected as it is a very heterogenous disease. 'Active surveillance' may be chosen as the initial course of action due to low risk of progression, whereas in other cases immediate androgen deprivation therapy may be administered even prior to biopsy due to high rates of presentation with advanced disease.
- Surgery wait times are measured from the date of diagnosis to the date of surgery. Wait times for radiation therapy/androgen deprivation therapy (ADT) is measured from the date of diagnosis to the start of treatment, whether it's radiation therapy alone, ADT alone, or ADT followed by radiation therapy. ADT can be administered early in the investigation and can be administered by various healthcare providers, including nurses, urologists, family physicians, ER physicians, community home nursing, or drug company-sponsored home nursing support.
- Between 2018 and 2021, median wait times for high- and intermediate-risk patients in B.C. ranged from 84-99 days for surgery and 53-64 days for non-surgical treatment. 90th percentile wait times were significantly longer.
- In B.C., the time to treatment decreased with increasing risk category. From 2018-2021, the median time to surgery for high-risk patients was 87 days, compared to 161 days for low-risk patients. For radiation therapy/ADT treatment, high-risk patients had a median wait time of 35 days, while low-risk patients waited 183 days.
- Median and 90th percentile wait times across Canada for prostate surgery in 2021 were 43 and 99 days.[10] B.C. wait times during this same period were higher with a median of 97 days and 90th percentile of 213 days for high- and intermediate-risk patients.
- Many low-risk prostate cancer patients are under active surveillance or watchful waiting before progressing to definitive treatment.
- Further analysis is required to isolate the active wait times for patients seeking to commence treatment. By targeting the waits at each respective interval of a patient's journey, from screening or symptom presentation, to referral, to biopsy, to diagnosis, to staging, to multidisciplinary review, and informed decision for treatment, and finally to recovery—we can gain a comprehensive understanding of the wait times, and the associated anxiety and challenges patients face when diagnosed with prostate cancer.

Figure 7-6 Time in days from diagnosis to surgery by year for high- and intermiediate-risk patients

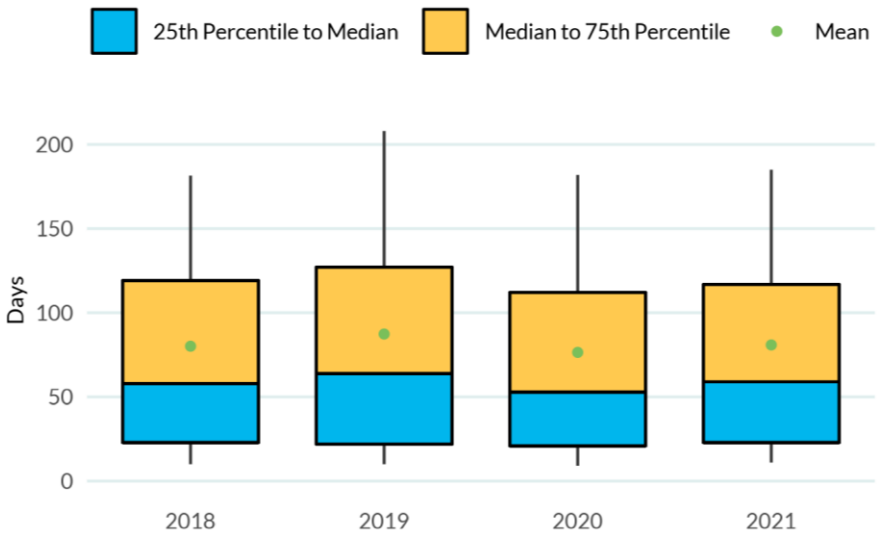


Notes: Patients include all stages.

Low Risk: PSA < 10 ng/mL and Gleason Score ≤ 6
High Risk: Either PSA > 20 ng/mL or Gleason Score ≥ 8
Intermediate Risk: Both PSA and Gleason score are under the 'high risk' threshold values
Unknown: Remaining cases that do not meet any of the above criteria.

Data table included in the Technical Supplement.

Figure 7-7 Time in days from diagnosis to radiation therapy/ADT by year for high- and intermiediate-risk patients



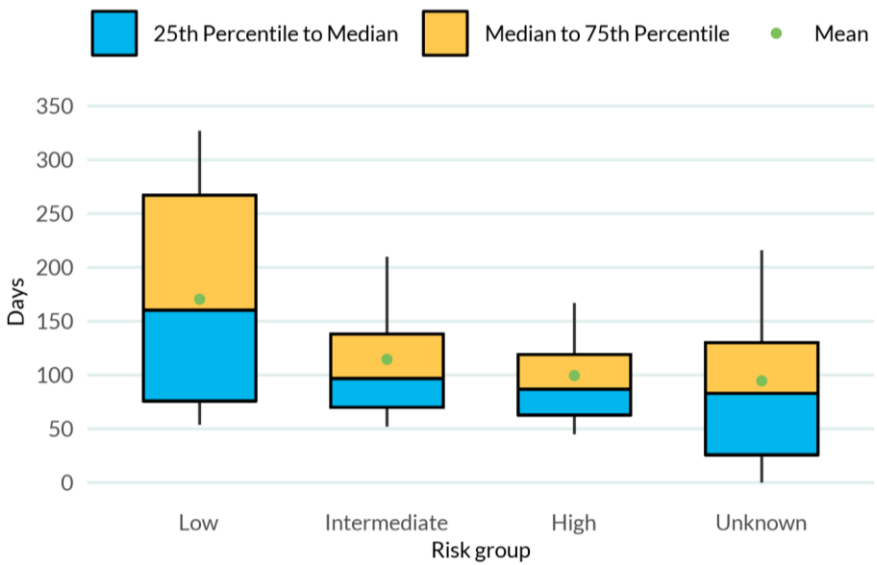
Notes: Radiation Therapy/ADT includes radiation therapy only, ADT followed by radiation therapy, or ADT only.

Patients include all stages.

Low Risk: PSA < 10 ng/mL and Gleason Score ≤ 6
High Risk: Either PSA > 20 ng/mL or Gleason Score ≥ 8
Intermediate Risk: Both PSA and Gleason score are under the 'high risk' threshold values
Unknown: Remaining cases that do not meet any of the above criteria.

Data table included in the Technical Supplement.

Figure 7-8 Time in days from diagnosis to surgery by risk group 2018-2021

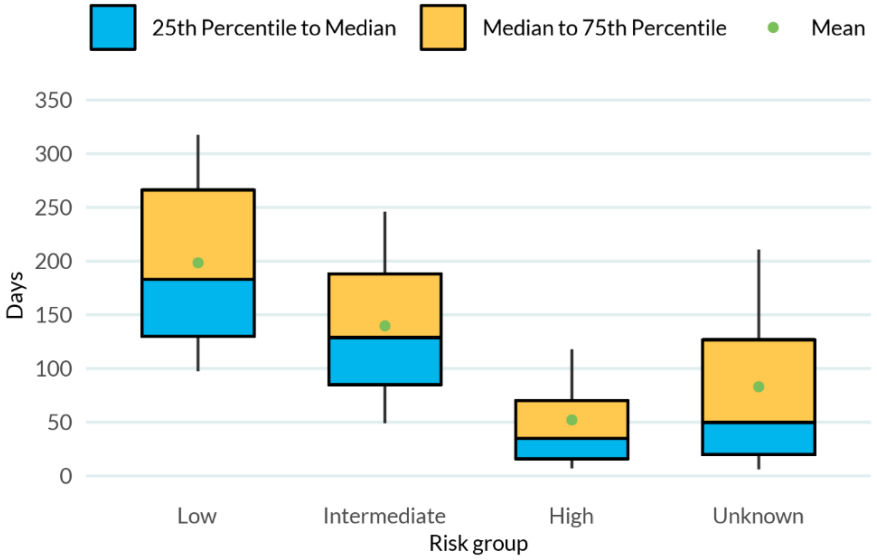


Notes: Patients include all stages.

Low Risk: PSA < 10 ng/mL and Gleason Score ≤ 6
High Risk: Either PSA > 20 ng/mL or Gleason Score ≥ 8
Intermediate Risk: Both PSA and Gleason score are under the 'high risk' threshold values
Unknown: Remaining cases that do not meet any of the above criteria.

Data table included in the Technical Supplement.

Figure 7-9 Time in days from diagnosis to radiation therapy/ADT by risk group 2018-2021



Notes: Radiation Therapy/ADT includes radiation therapy only, ADT followed by radiation therapy, or ADT only.

Patients include all stages.

Low Risk: PSA < 10 ng/mL and Gleason Score ≤ 6
High Risk: Either PSA > 20 ng/mL or Gleason Score ≥ 8
Intermediate Risk: Both PSA and Gleason score are under the 'high risk' threshold values
Unknown: Remaining cases that do not meet any of the above criteria.

Data table included in the Technical Supplement.

Low-risk prostate cancer patients who received a nuclear bone scan after diagnosis

- Clinical practice guidelines do not recommend the use of bone scans in very low- or low-risk localized prostate cancer patients.[11,12] Low-risk patients should not routinely undergo a bone scan since risk of recurrence and metastases is rare in this population. Additionally, bone scanning is an expensive, nonspecific staging modality that may require further investigations and delay therapy.[13,14]
- In B.C., the percentage of low-risk prostate cancer patients receiving a bone scan within six months of diagnosis has decreased from 8.7% in 2018, to 7.6% in 2021.
- In Ontario, 9% of low-risk prostate cancer patients received a bone scan within 6 months of diagnosis in 2018.[8]
- In a U.S. prospective cohort study of men diagnosed with prostate cancer in North Carolina and Louisiana (2004-2009), 15% of low-risk patients received a bone scan.[15]
- An analysis of prostate cancer patients in the Surveillance, Epidemiology and End Results (SEER) - Medicare database diagnosed from 2004-2007, found that 31% of low-risk patients for whom a bone scan was not recommended received one.[16]
- B.C.'s rate is comparable to Ontario's. While there has been a slight improvement in the proportion of low-risk patients receiving a bone scan, there is still room for improvement.

Table 7-6 Low-risk prostate cancer patients who received a nuclear bone scan after diagnosis

Year	Low-risk patients (N)	Post-diagnosis bone scan patients*	Post-diagnosis bone scan (%)
2018	462	40	8.7
2019	536	40	7.5
2020	518	39	7.5
2021	516	39	7.6

Note: Low-risk prostate cancer is defined as PSA < 10 ng/mL and a Gleason Score ≤ 6.

Treatment

Unplanned emergency department visits within 30 days of discharge from hospital post-surgery

- Emergency Department (ED) visits and hospital readmission rates within 30 days are an indicator to the quality of surgery and peri-operative care a patient received post radical prostatectomy.
- Unplanned ED visits and hospital readmissions post-surgery are associated with increased patient risk, patient discontent and resource utilization.
- Common reasons for revisiting the hospital within 30 days of a radical prostatectomy (a commonly performed cancer surgery) include genitourinary complications, anastomosis-related issues, infections, cardiovascular/ pulmonary events, and wound-related problems.[17]
- Hospital readmission rates ranged from 4% to 5.5% between 2018 and 2023. During this same time period, unplanned ED visits decreased from 29% to 22%.
- In 2019, B.C.'s post-surgery readmission rates were 5%, compared to 4% in Ontario.[8] Unplanned ED visit rates were similar across the two provinces in 2018 (26% in Ontario[8] and 28% in B.C.); B.C. rates have steadily declined since that time.
- In a recent systematic review and meta-analysis of 60 studies published between 2000 and 2020, the 30-day unplanned ED visit rate was 12% following prostatectomy for prostate cancer, and the 30-day readmission rate was 4%.[8] While B.C. compares on the unplanned readmission rate, ED visit rates are considerably higher than those reported in the meta-analysis.
- In B.C., both readmission and emergency room visit rates have declined from 2018 to 2023.

Table 7-7 Unplanned emergency department visits or readmissions within 30 days of discharge from hospital post-surgery

Year	Patients who had surgeries (N)	Unplanned emergency department visits (%)	Readmissions (%)
2018	1,013	28.7%	5.5%
2019	1,035	27.7%	5.2%
2020	1,026	22.2%	4.0%
2021	975	23.3%	4.5%
2022	1,023	23.3%	4.7%
2023	875	21.8%	4.9%

Low-risk patients who received no treatment

- Low risk prostate cancer has a very low chance of development of symptoms or metastatic spread if left untreated. Given that treatment for localized prostate cancer is often associated with a decline in quality of life due to treatment related side effects, a recommended approach to low risk localized prostate cancer is Active Surveillance. In Active Surveillance, no treatment is given to low-risk cancer patients, but it is monitored closely. Treatment is only undertaken if a patient's disease is showing signs of progression.[18]
- In 2021, 90% of low-risk patients received no treatment, a steady increase since 2018 at 84%.
- In 2018, 85% of low-risk patients in Ontario received no treatment.[8]
- B.C. is comparable to Ontario in minimizing risk to low-risk prostate cancer patients and has shown a slight trend in reducing over treatment.

Table 7-8 Low-risk patients who received no treatment

Year	Low-risk patients (N)	No treatment (N)	No treatment (%)
2018	412	345	83.7
2019	523	458	87.6
2020	516	443	85.9
2021	515	461	89.5

Notes: Low-risk patients exclude M-Stage 1

Positive margins following radical (or total) prostatectomy: pT2 and pT3

- The purpose of radical prostatectomy is to render a patient disease-free while simultaneously preserving functional outcomes such as erectile function and urinary continence.
- Positive surgical margins, i.e. when tumour cells are present at the edge of excised tissue, can be assessed via pathology and are associated with cancer recurrence.
- This indicator measures the percentage of pT2 and pT3 radical prostatectomy reports with positive margins.

pT2:

- Between 2019 and 2023, the annual positive margin rate at time of radical prostatectomy for pT2 prostate cancer in British Columbia ranged from 21% to 28%.

pT3:

- Between 2019 and 2023, the annual positive margin rate at time of radical prostatectomy for pT3 prostate cancer in British Columbia ranged from 49% to 54%.
- The frequency of positive margins of resection during prostatectomy depends on numerous factors including disease stage, the surgical technique (open or laparoscopic) that was used and experience of the surgeon.[19]
- The risk of positive tumour margins must also be balanced against the preservation of urinary and erectile functions.
- Ontario has set a margin positivity target of 20% for patients with pT2 tumours undergoing radical prostatectomy and of 40% for patients with pT3 tumours.[8]
- The positive margin rate in B.C. has room for improvement from its current rates of 21-28% for pT2 and 49-54% for pT3 cancer.

Table 7-9 pT2 radical prostatectomy reports with positive margins

Year	Volume	Positive margin counts	B.C. positive margin (%)	Positive margin lower limit (%)	Positive margin upper limit (%)
2019	425	108	25.4	21.3	29.8
2020	455	95	20.9	17.2	24.9
2021	451	128	28.4	24.3	32.8
2022	509	128	25.1	21.4	29.2
2023	468	103	22.0	18.3	26.0

Table 7-10 pT3 radical prostatectomy reports with positive margins

Year	Volume	Positive margin counts	B.C. positive margin (%)	Positive margin lower limit (%)	Positive margin upper limit (%)
2019	425	227	53.4	48.5	58.2
2020	458	224	48.9	44.2	53.6
2021	496	243	49.0	44.5	53.5
2022	562	302	53.7	49.5	57.9
2023	568	303	53.3	49.1	57.5

High-risk patients who received Androgen Deprivation Therapy (ADT) while undergoing radiotherapy

- The combination of androgen deprivation therapy (ADT) and radiation therapy significantly improves both disease-free and overall survival in high-risk prostate cancer patients over radiation therapy alone. This combination of treatment forms the standard of care for high-risk prostate cancer patients.[20]
- In B.C., the percentage of high-risk prostate cancer patients receiving combination ADT and radiation therapy remains high, ranging from 87-89% between 2018 and 2021.
- B.C.'s performance is on par with other jurisdictions. A cohort study in the state of Victoria, Australia found 83% of high-risk patients between 2010 and 2015 had combination treatment.[21] In 2021 Ontario rates were 90-93% from 2014 to 2018.[8]
- While medical contraindications or patient preference can preclude combining ADT with radiation therapy, it still forms the standard of care for high-risk prostate cancer patients. B.C. is doing very well, consistently maintaining a high proportion of patients on this treatment.

Table 7-11 High-risk patients who received ADT while undergoing radiotherapy

Year	High-risk patients on radiotherapy (N)	Concurrent ADT & radiotherapy (N)	Concurrent ADT & radiotherapy (%)
2018	379	335	88.4
2019	360	321	89.2
2020	350	304	86.9
2021	418	369	88.3

New Metastatic Castration-Sensitive Prostate Cancer (mCSPC) Patients Who Received Androgen Deprivation Therapy (ADT) with concurrent Androgen Receptor Axis-Targeted Therapies (ARAT)

- Patients with mCSPC experienced improved survival when treated with ADT concurrently with ARAT.
- In B.C., 7% of mCSPC patients received ADT concurrently with ARAT between 2018 and 2020; the rate spiked to 31% in 2021.
- In Ontario, 26% of mCSPC patients during 2018 received ADT concurrently with ARAT. This number spiked from 15% in 2017 following the approval of ARAT.[8]
- An Alberta study of 960 patients with mCSPC from 2016-2020 revealed that 33% of patients received a combination of ADT with ARAT.[22]
- A prospective multicentre, longitudinal cohort study across 25 Canadian sites of men with advanced prostate cancer from 2018 to 2021 found that 'treatment intensification with ARATs/docetaxel was administered to 69% of patients'.[23]
- Early intensification with an ARAT is standard of care in the mCSPC setting. B.C.'s results for 2021 are comparable to other provinces, but there is room for significant improvement. Future data analysis will assess if rates continued to increase from 2022.

Table 7-12 New mCSPC – ADT with concurrent ARAT therapies

Year	mCSPC patients (N)	ARAT concurrent with ADT (N)	ARAT concurrent with ADT (%)
2018	305	21	6.9%
2019	339	24	7.1%
2020	249	17	6.8%
2021	339	105	31.0%

Note: Patients who utilized a pharmaceutical support program are not included in the count of patients receiving ARAT concurrent with ADT. If these patients were included, the percentage receiving ARAT with concurrent ADT could increase. Further analysis is required.

Chapter End Notes

[1] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023. p. 29.

[2] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023. p. 22.

[3] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023. p. 46.

[4] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023. p. 53.

[5] Government of British Columbia. CancerPlan2023 [Internet]. Victoria, BC: Government of British Columbia. Available from: https://www.gov.bc.ca/CancerPlan2023.pdf. p. 15.

[6] Canadian Cancer Statistics Advisory Committee. Canadian Cancer Statistics 2023. Toronto, ON: Canadian Cancer Society; 2023. p. 81.

[7] Government of British Columbia. CancerPlan2023 [Internet]. Victoria, BC: Government of British Columbia. Available from: https://www.gov.bc.ca/CancerPlan2023.pdf. p. 16.

[8] Chaudhry M, Kandasamy S, Habbous S, Chan C, Barisic A, Faisal A, Walker M, Haque M, Sheppard A, Uri E, Ashu E, Schwartz N, Young S, McCurdy B. Cancer System Quality Index Report 2021. Ontario: Ontario Health; 2021. Available from: https://www.ontariohealth.ca/sites/ontariohealth/files/csqi-report-2021.pdf

[9] Cancer Care Alberta. The 2024 Report on Cancer Statistics in Alberta. Distribution of New Cases by Stage at Diagnosis for Prostate Cancer, Alberta, 2020-2021 [Internet]. Alberta: Cancer Care Alberta; 2024 [cited 2024 Jul 10]. Available from: https://public.tableau.com/app/profile/cancercontrol.ab/viz/The2024ReportonCancerStatisticsinAlberta/Highlights

[10] Canadian Institute for Health Information. Explore wait times for priority procedures across Canada [Internet]. Available from: https://www.cihi.ca/en/explore-wait-times-for-priority-procedures-across-canada

[11] National Comprehensive Cancer Network. Clinical Practice Guidelines in Oncology: Prostate Cancer. Version 2.2020. J Natl Compr Canc Netw. Available from: https://www.nccn.org/professionals/physician_gls/pdf/prostate.pdf

[12] American Medical Association. Quality ID #102: Prostate Cancer: Avoidance of Overuse of Bone Scan for Staging Low Risk Prostate Cancer Patients (Version 8.0) [Internet]. 2023 Dec. Available from: https://www.auanet.org/documents/Quality/2024%20Measures/2024_Measure_102_MIPSCQM.pdf

[13] Hur J, Yoon CS, Ryu YH, Yun MJ, Suh JS. Accuracy of fluorodeoxyglucose-positron emission tomography for diagnosis of single bone metastasis: comparison with bone scintigraphy. J Comput Assist Tomogr. 2007 Sep 1;31(5):812-9.

[14] Gomez P, Manoharan M, Kim SS, Soloway MS. Radionuclide bone scintigraphy in patients with biochemical recurrence after radical prostatectomy: when is it indicated?. BJU int. 2004 Aug;94(3):299-302.

[15] Holmes JA, Bensen JT, Mohler JL, Song L, Mishel MH, Chen RC. Quality of care received and patient-reported regret in prostate cancer: analysis of a population-based prospective cohort. Cancer. 2017 Jan 1;123(1):138-43.

[16] Falchook AD, Salloum RG, Hendrix LH, Chen RC. Use of bone scan during initial prostate cancer workup, downstream procedures, and associated Medicare costs. Int J Radiat Oncol Biol. 2014 Jun 1;89(2):243-8.

[17] Mukkala AN, Song JB, Lee M, Boasie A, Irish J, Finelli A, Wei AC. A systematic review and meta-analysis of unplanned hospital visits and re-admissions following radical prostatectomy for prostate cancer. Can Urol Assoc J. 2021 Oct;15(10):E531-44.

[18] Phillips C. Active Surveillance for Low-Risk Prostate Cancer Continues to Rise. National Cancer Institute; 2022 Jun 23. Available from: https://www.cancer.gov/news-events/cancer-currents-blog/2022/prostate-cancer-active-surveillance-increasing

[19] Grypari IM, Zolota V, Tzelepi V. Radical or not-so-radical prostatectomy: do surgical margins matter?. Cancers (Basel). 2021;14(1):13.

[20] BC Cancer. Prostate cancer management manual [Internet]. Vancouver: BC Cancer. Available from: http://www.bccancer.bc.ca/health-professionals/clinical-resources/cancer-management-manual/genitourinary/prostate

[21] Ong WL, Foroudi F, Evans S, Millar J. Large institutional variations in use of androgen deprivation therapy with definitive radiotherapy in a population-based cohort of men with intermediate- and high-risk prostate cancer. BJU Int. 2017 Nov;120:35-42. doi: 10.1111/bju.13969. Epub 2017 Aug 19. PMID: 28749017.

[22] Karim S, Lowther J, Gyulay G, O'Sullivan D, Wallis CJ, Yip SM, Brenner DR, Boyne DJ, Cheung WY. A Real-World Evidence Study Using Alberta-Population-Based Data to Describe Treatment Patterns for Metastatic Castration-Sensitive Prostate Cancer Patients (AWARENESS). Curr Oncol, 2023;30(9):8149–58. doi: 10.3390/curroncol30090591

[23] Yip S, Niazi T, Hotte SJ, Lavallee L, Finelli A, Kapoor A, Kolinsky MP, Ong M, Pouliot F, Antebi E, Drachenberg D., Gotto G, Hamilton R.J, Noonan K, Rendon R.A, Shayegan B, Zardan A, Chi K.N, Saad F, Morash C. Evolving real-world patterns of practice in metastatic castration-sensitive prostate cancer (mCSPC): The genitourinary research consortium (GURC) national multicenter cohort study. J Clin Oncol. 2022; 40(6):86. doi: https://doi.org/10.1200/JCO.2022.40.6_suppl.086

Chapter 8: End of Life

End of Life Summary

The purpose of end-of-life care is to optimize the quality of remaining life for persons with cancer. This requires supporting each individual holistically and minimizing pain and suffering. It also includes supporting the caregivers of these individuals as end-of-life is a time when numerous treatment- and care-related decisions are made.

This chapter highlights two indicators reflecting care for cancer patients at end-of-life, one focusing on emergency department (ED) visits and the other on systemic treatment within the last 30 days of life.

This data for Emergency Department (ED) visits suggests an ongoing trend of increased ED visits at the end of life, indicating that patients may not be able to access community-based services to meet their palliative care needs as they approach end of life.

The data for systemic treatment suggests that B.C. aligns closely with rates and targets from other jurisdictions.

Data Sources

The main data source used in this section was the BC Cancer Registry, which at the time of this analysis included all cases of cancer among BC residents to the end of 2021. Indicators in this section are supported by linkage of the BC Cancer Registry to the BC Cancer Pharmacy database and the National Ambulatory Care Reporting System (NACRS). At the time of analysis these additional data sources typically had health service follow-up data available to the end of 2023. More details on data sources can be found in the accompanying technical appendix for this report.

Indicators

Emergency department visits in the last 30 days of life

- Emergency Department (ED) visits in the last 30 days of life is seen as an indicator of aggressive end of life care or unmet palliative care needs for patients in community. ED visits are sometimes appropriate regardless of level of community supports and advanced planning (e.g. unexpected deterioration in clinical status, acute symptoms). Reduction, not elimination of ED visits in the last 30 days of life is a goal that supports patient centered care, aiming to provide timely assessment and treatment in community as patients approach end of life.
- In 2023, on average, 45% of patients with cancer visited the ED one or more times within the last 30 days of life. This varied from a low of 41% of patients with prostate cancer, to a high of 46% of patients with "other" cancers.
- In an examination of health data from Ontario, Nova Scotia and B.C. from 2004-2015, the percentage of B.C. patients visiting the ED in the last 2 weeks before death increased from 37% to 42% from 2004 to 2015; in Nova Scotia and Ontario, the percentage of patients attending ER remained stable or decreased over the same years.[1] These more recent numbers suggest a further ongoing trend of increased ED visits for those at end of life.
- While an imperfect indicator, there is need for improvement due to the rate increasing over time. This is suggestive of patients not being able to access community-based services to meet their palliative care needs as they approach end of life.

Table 8-1 Emergency department visits in the last 30 days of Life in B.C.

Year of Death	All Cancer (%)	Breast (%)	Cervical (%)	Colorectal (%)	Lung (%)	Prostate (%)	Other Cancer (%)
2018	43.5	39.4	33.9	40.4	45.1	34.7	45.0
2019	44.3	41.1	46.7	43.6	42.0	38.6	46.4
2020	44.1	41.0	39.3	41.4	45.0	35.6	45.6
2021	44.6	42.7	37.9	42.9	44.6	34.2	46.5
2022	43.8	41.2	44.0	41.0	44.3	35.7	45.6
2023	45.1	43.5	44.1	44.2	45.5	40.8	45.8

Systemic treatment in the last 30 days of life

- Use of systemic antineoplastic therapy at the end of life is associated with higher rates of hospitalization, increased intensive care use, a worse quality of life and higher costs.[2,3,4,5]
- The proportion of patients treated with antineoplastic therapy in the last year of life that were prescribed therapy within the last 30 days of life has remained relatively stable between 2016 and 2021 (range 27-29%).
- 20% (colorectal) to 37% (breast) of patients treated with antineoplastic therapy in the last year of life, were prescribed therapy within the last 30 days of life. This range was consistent within the most common subtypes of breast, colorectal, lung and prostate cancer. Rates for cervical cancer were somewhat lower (18% between 2016 and 2021).
- While results in B.C. are consistent with rates seen in other countries and analyses.[6,7,8,9,10,11] cross-jurisdictional or institutional comparisons are difficult to make due to differences in methods, data sources and time periods.
- Some organizations have created a quality metric. Specifically, The American Society of Clinical Oncology and the National Quality Forum (NQF) have created a quality metric, identified as NQF 0210 (patients receiving chemotherapy in the last 14 days of life).[12] Earle et al. proposed a benchmark of less than 10% of patients receiving systemic therapy in the last 14 days of life.[11] In B.C. (not shown) the proportion of patients prescribed systemic antineoplastic therapy within the last 14 days of life is 13% across the 2016-2021 timeframe.
- The proportion of patients prescribed systemic antineoplastic therapy within the last 30 days of life has remained relatively stable between 2016 and 2021. It is in line with what is seen in other jurisdictions and when further analyzed using the last 14 days of life benchmark, is close to the proposed quality benchmark of 10% or less.

Table 8-2 Systemic treatment, end of life

Year	All Cancer (%)	Breast (%)	Cervical (%)	Colorectal (%)	Lung (%)	Prostate (%)
2016	27.2	33.7		22.3	22.3	21.6
2017	26.6	30.4		20.5	33.0	25.5
2018	27.6	35.0		24.4	31.6	23.1
2019	27.7	37.1		20.6	24.5	21.0
2020	28.3	35.2		20.2	29.7	27.9
2021	29.1	36.2		21.9	29.2	23.4
2016-2021	27.8	34.6	17.6	21.7	28.4	23.7

Notes: End of life is considered the last 30 days of life.

Chapter End Notes

[1] Khan AF, Seow H, Sutradhar R, Peacock S, Chan KK, Burge F, McGrail K, Raymakers A, Lawson B, Barbera L. Quality of end-of-life cancer care in Canada: a 12-year retrospective analysis of three provinces' administrative health care data evaluating changes over time. Current Oncology. 2021 Nov 12;28(6):4673-85.

[2] McPherson JP, Patel SB, Igumnova E, Pettit J, Ose D, Haydell T, et al. Real-time assessment of resource utilization and subsequent cost analysis in cancer patients (pts) near the end of life (EOL). Journal of clinical oncology. 2018 Oct 20;36(30_suppl):303–3

[3] Gidwani-Marszowski R, Asch SM, Mor V, Wagner TH, Faricy-Anderson K, Illarmo S, Hsin G, Patel MI, Ramchandran K, Lorenz KA, Needleman J. Health system and beneficiary costs associated with intensive end-of-life medical services. JAMA Network Open. 2019 Sep 4;2(9):e1912161-.

[4] Bao Y, Maciejewski RC, Garrido MM, Shah MA, Maciejewski PK, Prigerson HG. Chemotherapy use, end-of-life care, and costs of care among patients diagnosed with stage IV pancreatic cancer. Journal of pain and symptom management. 2018 Apr 1;55(4):1113-21.

[5] Urban RR, He H, Alfonso R, Hardesty MM, Goff BA. The end of life costs for Medicare patients with advanced ovarian cancer. Gynecologic oncology. 2018 Feb 1;148(2):336-41.

[6] Ferraz-Gonçalves JA, Silva I, Redondo P, Luís MS. Aggressiveness in systemic anticancer therapy at the end of life in an oncology center. Porto Biomedical Journal. 2024 Mar 1;9(2):248.

[7] Mattsson TO, Pottegård A, Jørgensen TL, Green A, Bliddal M. End-of-life anticancer treatment–a nationwide registry-based study of trends in the use of chemo-, endocrine, immune-, and targeted therapies. Acta oncologica. 2021 Aug 3;60(8):961-7.

[8] Edman Kessler L, Sigfridsson J, Hatzidaki D, Bergh J, Foukakis T, Georgoulias V, Matikas A. Chemotherapy use near the end-of-life in patients with metastatic breast cancer. Breast Cancer Research and Treatment. 2020 Jun;181:645-51.

[9] Sivendran S, Lynch S, McNaughton C, Wong R, Svetec S, Moore JH, Holliday R, Oyer RA, Newport K. Anticancer therapy at the end of life: lessons from a community cancer institute. Journal of Palliative Care. 2021 Apr;36(2):87-92.

[10] Singh J, Stensvold A, Turzer M, Ellen Karine Grov. Anticancer therapy at end-of-life: A retrospective cohort study. Acta oncologica. 2024 May 8;63:313–21.

[11] Canavan ME, Wang X, Ascha MS, Miksad RA, Calip GS, Gross CP, Adelson KB. Systemic anticancer therapy at the end of life—changes in usage pattern in the immunotherapy era. JAMA oncology. 2022 Dec 1;8(12):1847-9.

[12] Earle CC, Neville BA, Landrum MB, Souza JM, Weeks JC, Block SD, Grunfeld E, Ayanian JZ. Evaluating claims-based indicators of the intensity of end-of-life cancer care. International Journal for Quality in Health Care. 2005 Dec 1;17(6):505-9.

Next Steps

The data in this inaugural report has provided an invaluable opportunity to assess and reflect on the performance of B.C.'s Cancer System. It has highlighted areas where the system is performing well, areas in need of improvement, and further analysis required to better understand performance.

Indigenous Cancer Care

Identifying feasible indicators for reporting the cancer care experience of First Nations, Métis, and Inuit people in the province posed challenges due to several data limitations. Ongoing collaboration between BC Cancer and the First Nations Health Authority, as well as BC Cancer and the Métis Nation BC, aims to improve data linkages, enhance reporting capabilities, and execute actions to address health disparities. The goal is to include more specific Indigenous Cancer Care indicators in future iterations of this report.