Real-World Evidence in Canada: Baseline Estimates to Support Health Technology Assessment

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Introduction

- Many solid tumours such as bladder (BIC), biliary tract (BTC), cervical (CC), colorectal (CRC), endometrial (EC), non–small cell lung (NSCLC) ovarian (OC), pancreatic (PC), and salivary gland (SGC) cancers contribute substantially to the Canadian health burden.[1,2]
- Standard therapies for advanced or metastatic solid tumours rely largely on chemotherapy-based standard of care (SoC), with few established options beyond first line and limited benefit for many patients.[3]
- The purpose of this targeted literature review was to investigate clinical, epidemiological, and economic outcomes for patients in Canada with solid tumours to inform and validate health economic models for HTA submissions to Canadian public payers.

Methods

- Electronic databases (EMBASE and MEDLINE), conference proceedings, and CDA-AMC database were searched using structured and free-text search terms for observational studies and economic evaluations in Canada covering patients with BIC, BTC, CC, EC, OC, PC, and SGC in the December 11, 2023, search, with the May 7, 2024, search extending the scope to include NSCLC and CRC (Table 1). Searches for a TLR update were on March 27, 2026.
- Studies reporting clinical outcomes published in 2008 or later, or epidemiological or economic outcomes in 2013 or later, were included. Conference abstracts reporting any outcome of interest published in 2020 or later were included.
- Titles and abstracts of identified studies were screened by one independent researcher against pre-defined inclusion and exclusion criteria, with a second reviewer performing quality checks on an arbitrary sample of records; full-text review of potentially eligible studies was conducted by one reviewer using the same criteria, with random-sample quality checking by a second reviewer. Data from included studies were extracted into a tabular summary.

Table 1 Study inclusion criteria

Component	Description
Population	Patients with advanced or metastatic BTC, PC, BIC, OC, CC, EC, SGC, CRC, and NSCLC*
Interventions & comparators	Chemotherapy regimens, including immunotherapies and targeted therapies
Outcomes	• **Clinical outcomes,** including but not restricted to: OS, PFS, DoT, TTNT, ORR • **Epidemiological outcomes,** including but not restricted to: age, gender, HER2 expression (IHC 3+), prior lines of therapy, treatment patterns • **Healthcare resource utilization and costs,** including but not restricted to: outpatient visits, ER visits, inpatient stays, LOS, pharmacological interventions, non-pharmacological interventions, direct costs, indirect costs, cost-drivers
Study type	Observational studies and economic evaluations
Language	English
Geography	Canada
Publication years	• Clinical outcomes: past 15 years • epidemiologic and economic outcomes: past 10 years • conference abstracts: past 3 years

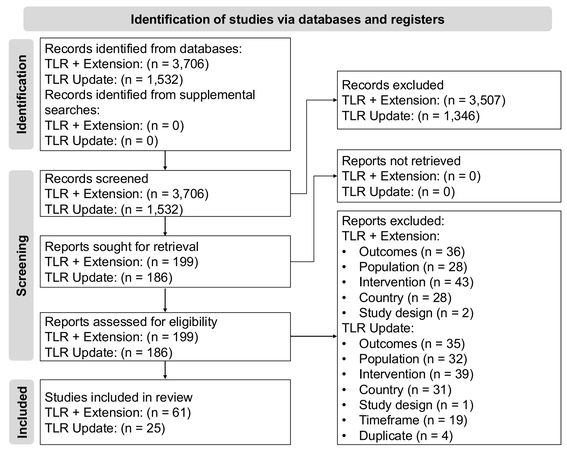
*CRC and NSCLC were restricted to those receiving second-line therapy or later
BIC, bladder cancer; BTC, biliary tract cancer; CC, cervical cancer; CRC, colorectal cancer; DoT, duration of treatment; EC, endometrial cancer; ER, emergency room; IHC, immunohistochemistry; LOS, length of stay; NSCLC, non-small cell lung cancer; OC, ovarian cancer; OS, overall survival; PC, pancreatic cancer; PFS, progression-free survival; SGC, salivary gland cancer; TTNT, time to next treatment

Results

Study identification

- This review included 86 studies, of which 19 were exclusively metastatic and 40 included metastatic patients within broader cohorts. (Figure 1 and Supplementary table 1).

Figure 1 PRISMA diagram



Note: The full search strategy can be made available upon request.

- Most studies reported outcomes for NSCLC (N=31) or PC (N=16) (Table 2), while few studies reported on BTC (N=5), EC (N=5), or CC (N=3). 16 studies reported 2L outcomes, while 24 reported 2L+ outcomes, of which 12 also reported 3L or later line outcomes separately.
- No Canadian observational studies reported epidemiological, clinical, or economic outcomes for SGC, with additional gaps in economic outcomes for chemotherapy-treated BTC and EC.

Table 2 Summary of included studies

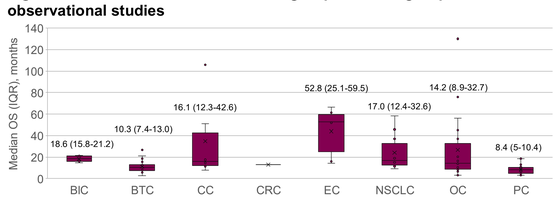
	BIC	BTC	CC	CRC	EC	NSCLC	OC	PC	SGC
N	8	5	3	8	5	31	10	16	0
Clinical outcomes, n	5	5	2	3	4	16	8	12	0
Treatment patterns, n	4	3	1	3	1	15	2	9	0
Economic outcomes, n	1	0	1	3	0	7	4	2	0

BIC, bladder cancer; BTC, biliary tract cancer; CC, cervical cancer; CRC, colorectal cancer; EC, endometrial cancer; NSCLC, non-small cell lung cancer; OC, ovarian cancer; PC, pancreatic cancer; SGC, salivary gland cancer

Overall survival

- Median OS was reported in 29 studies (Figure 2). It ranged from 2.7 (95% CI: 2.3–3.0) months for a subgroup of patients with BTC, to 130 (95% CI: 86–174) months for a subgroup of patients with OC (Figure 2).

Figure 2 Median overall survival for all groups and subgroups in Canadian observational studies

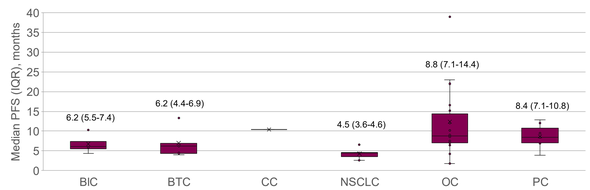


BIC, bladder cancer; BTC, biliary tract cancer; CC, cervical cancer; CRC, colorectal cancer; EC, endometrial cancer; NSCLC, non-small cell lung cancer; OC, ovarian cancer; OS, overall survival; PC, pancreatic cancer;

Progression-free survival

- Median PFS ranged, reported in 19 studies, ranged from 2.6 (95% CI: 2.0–6.4) months for NSCLC to 61.2 months for patients with EC. Median PFS for CRC was not reported in the literature (Figure 3).

Figure 3 Median progression-free survival for all groups and subgroups in Canadian observational studies



BIC, bladder cancer; BTC, biliary tract cancer; CC, cervical cancer; CRC, colorectal cancer; EC, endometrial cancer; NSCLC, non-small cell lung cancer; OC, ovarian cancer; PC, pancreatic cancer; PFS, progression-free survival

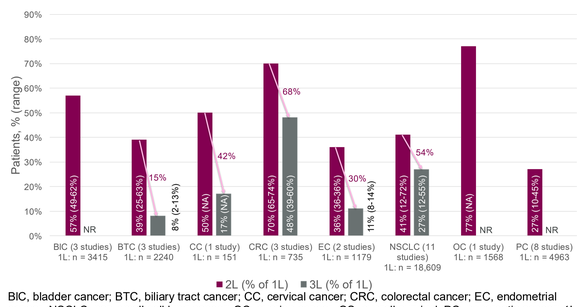
Time to next treatment

- Median TTNT was 7.6 (95% CI: 6.1–9.9) months for patients with stage III/IV EC receiving 2L chemotherapy or hormone therapy.[4]

Treatment attrition

- Across treatment lines, chemotherapy remained the predominant treatment approach, while in some tumour cohorts, subsequent lines increasingly incorporated immunotherapeutic and targeted regimens alongside chemotherapy..
- Most patients with CRC received combination systemic chemotherapy as 1L treatment, and frequently 2L treatment. Later lines of treatment exhibited variation in the types of agents used, including single-agent immunotherapies and biologics.[5]
- Among patients undergoing first-line treatment, there was a noteworthy decrease in the subsequent utilization of second line (2L) treatment across indications (Figure 4). Of note,1L-treated patients were normalized to 100%, with subsequent treatment attrition reported relative to the preceding treatment line. Contributing studies differed in population and attrition definitions, and censoring methodology was not accounted for.
- The data further indicated a more pronounced reduction in the number of patients transitioning to third-line (3L) and beyond treatments.

Figure 4 Proportion of patients receiving treatment by indication and line of therapy



BIC, bladder cancer; BTC, biliary tract cancer; CC, cervical cancer; CRC, colorectal cancer; EC, endometrial cancer; NSCLC, non-small cell lung cancer; OC, ovarian cancer; OS, overall survival; PC, pancreatic cancer; 1L, first line; 2L, second line; 3L, third line;
Note: 1L normalized to 100%. 2L represents % of 1L; 3L bars represent % of 1L reaching 3L. Pink arrows indicate % of 2L patients progressing to 3L.

Overall costs and cost drivers

- Hospitalization costs were the primary component of total healthcare spending for NSCLC, OC, CC, and CRC, while ambulatory cancer care costs were higher for PC.

Table 3 Direct medical costs and cost drivers across tumour types

	Stage	Total cost/patient (CAD)	Key cost drivers
BIC	IV	**By CT regimen:** $261,296 – $455,513 Time horizon of 10 years	NR
CC	III/IV	**By stage:** $24,043 (III) – $41,022 (IV)	Hospitalization, outpatient care
CRC	III/IV	**By cancer site and stage — first year after diagnosis:** Colon: $60,705 (III) – $72,032 (IV) Rectosigmoid & rectum: $71,340 (III) – $76,831 (IV)	Hospitalization, non-oncology physician visits
NSCLC	III/IV	**By stage:** $68,295 (IV) – $87,393 (III) **By EGFR-TKI regimen:** $130,717 (afatinib) – $169,243 (erlotinib) Mean total cost over 68-month period	Hospitalization, specialist visits, non-oncology physician visits, outpatient care
OC	III/IV	**By line of therapy:** $52,277 (2L) – $97,243 (4L) By stage $114,713 (III) – $124,202 (IV)	Hospitalization, ER visits, specialist visits, outpatient care
PC	III	**By CT regimen:** $101,518 – $103,844	Hospitalization, ambulatory care, non-oncology physician visits

Note: unless otherwise stated, costs reflect mean 5-year total cost per patient. Follow-up periods and study designs vary cross-tumour comparisons should be interpreted with caution.
BIC, bladder cancer; CC, cervical cancer; CRC, colorectal cancer; CT, chemotherapy; ER, emergency room; NR, not reported; NSCLC, non-small cell lung cancer; OC, ovarian cancer; PC, pancreatic cancer; TKI, tyrosine kinase inhibitor.

Conclusions

- This was the first TLR to consolidate clinical, epidemiological, and economic outcomes across multiple tumour types for the Canadian HTA context, and it provides a replicable methodological framework for informing and validating future health economic models in Canada. Notably, no restriction on line of treatment was applied to maximize the capture of potentially applicable studies Caution is advised when using these findings to validate health economic models, as the study population may differ from target model population.
- Solid malignancies are associated with poor prognoses and urgently need more effective treatment options.
- There is substantial variability in the quantity of evidence available between tumour types in Canada across clinical, epidemiological, and economic outcomes.
- Treatment patterns show a decline in subsequent lines of therapy, , alongside increased use of palliative care and higher associated costs in later lines of treatment.
- High medical costs are associated with advanced cancer stages and are primarily driven by hospitalizations for patients with most types of solid tumours.
- Findings may support the generalizability of data from global populations to the Canadian context, and the validity of clinical trial extrapolations.

References

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