

ARCC

Canadian Centre
for Applied Research
in Cancer Control



BC Cancer Agency
CARE & RESEARCH
An agency of the Provincial Health Services Authority

Cancer Care Ontario
Action Cancer Ontario



Canadian Cancer Society
Société canadienne du cancer

COMPARING PHASE-BASED COSTS OF CANCER CARE IN BRITISH COLUMBIA AND ONTARIO

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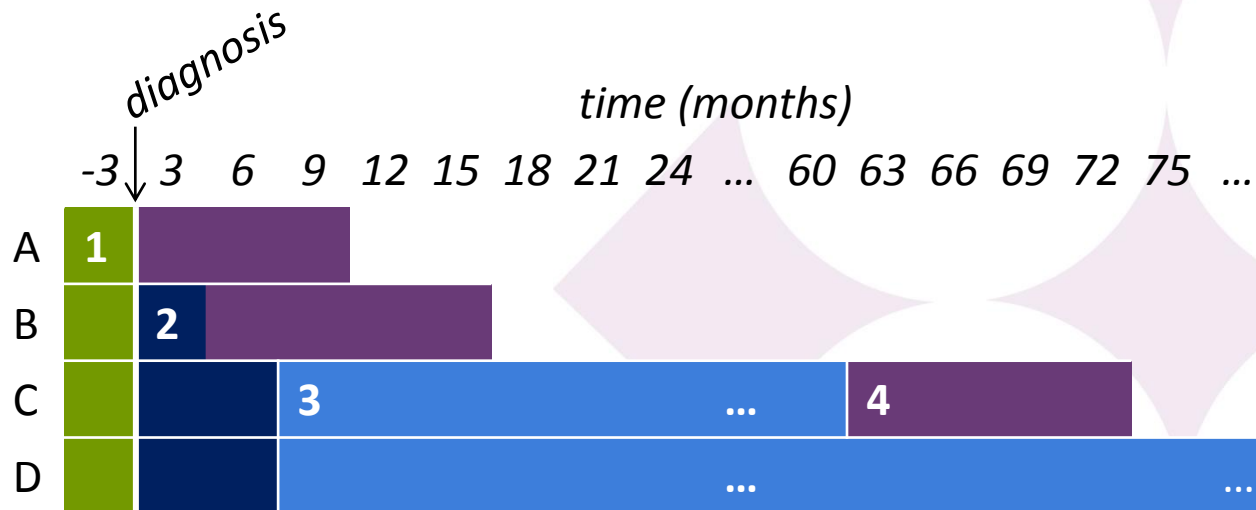
BC-ON Costing Study

- Objective
 - To estimate direct medical costs and predictors of these costs for 21 common types of cancer and 4 phases of care (pre-diagnosis, initial, continuing care, and terminal), using linked administrative data in BC and Ontario
- Cases from BC Cancer Registry and Ontario Cancer Registry diagnosed in 1997-2007
- Follow up to the end of 2009

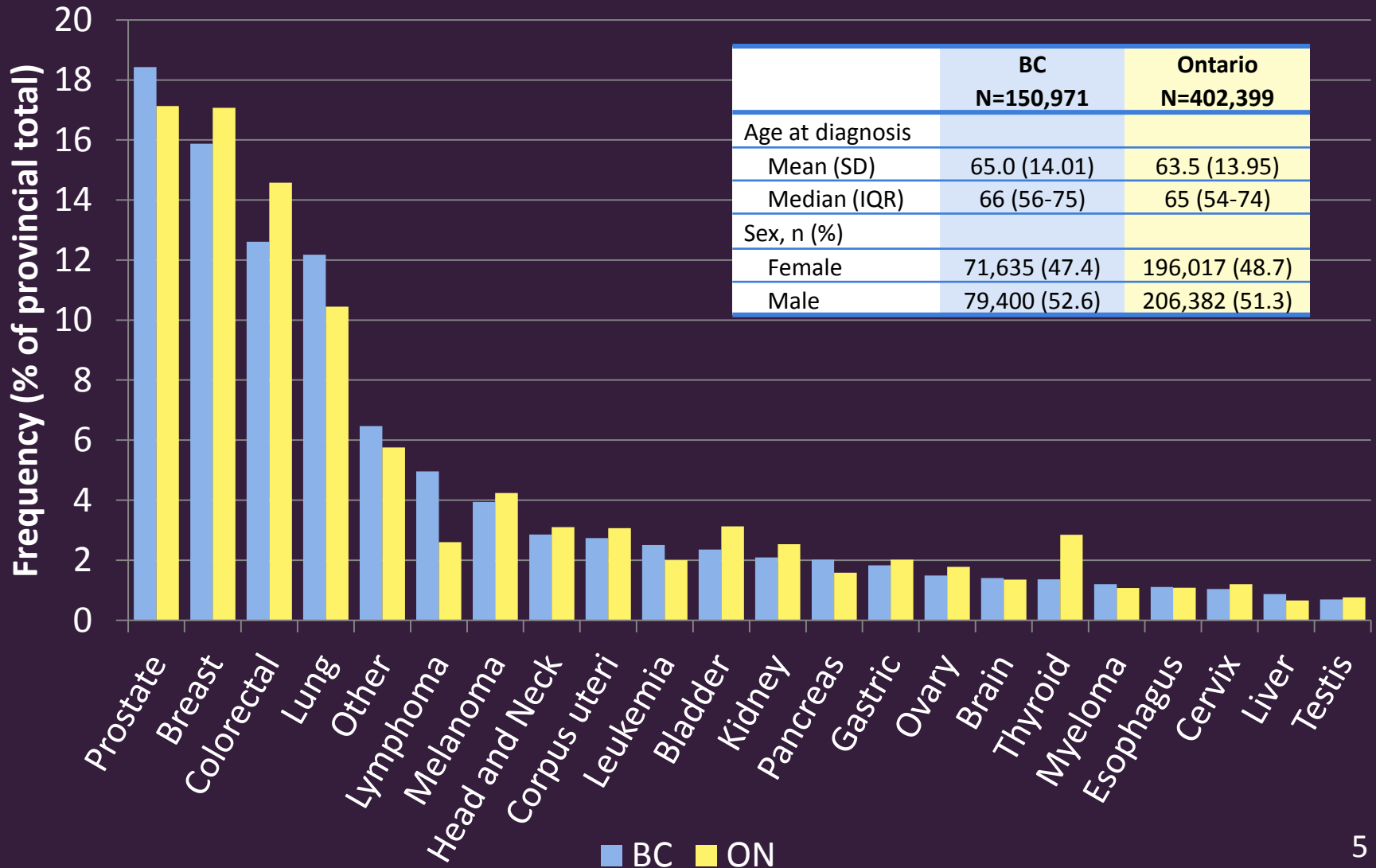
Phase-based costing

- Course of disease divided into distinct phases
- Observation time after diagnosis is allocated to phases hierarchically:

Terminal Phase (12 mo) > Initial Phase (6 mo) > Continuing Care Phase



Study Cohorts



	British Columbia	Ontario
Hospitalization	Discharge Abstract Database (Hospital Separations)	Discharge Abstract Database
Physician services	Medical Services Plan (MSP) Payment Information File; BCCA Schedule data	Ontario Health Insurance Plan (OHIP) claims
Outpatient prescription drugs	PharmaNet	Ontario Drug Benefit (ODB) Program
Chemotherapy	BCCA Provincial Systemic Therapy Program	New Drug Funding Program, ODB, National Ambulatory Care Reporting System (NACRS)
Radiotherapy	BCCA Radiotherapy database	Cancer Care Ontario Activity Level Reporting System
Home and Community Care	Home and Community Care (Continuing Care) Data	ON Home Care Database, Continuing Care Reporting System, ODB database
Diagnostics	MSP Payment Information File, BCCA Schedule and Document data	OHIP claims

Key Differences





- Registry data
 - Diagnosis date definition: clinical vs. pathological
- Oncologist services:
 - ON: claims or shadow billing in OHIP, except for RadOncs
 - BC: no fee-for-service; used BCCA appointment data
- Diagnostics
 - ON: claims in OHIP; professional and technical components
 - BC: some claims in MSP; limited data for lab/imaging services from budgets
- Radiotherapy
 - ON: NHPIP workload measurement
 - BC: estimated from BCCA radiotherapy data and unit cost per fraction

Key Differences

- Chemotherapy drug cost:

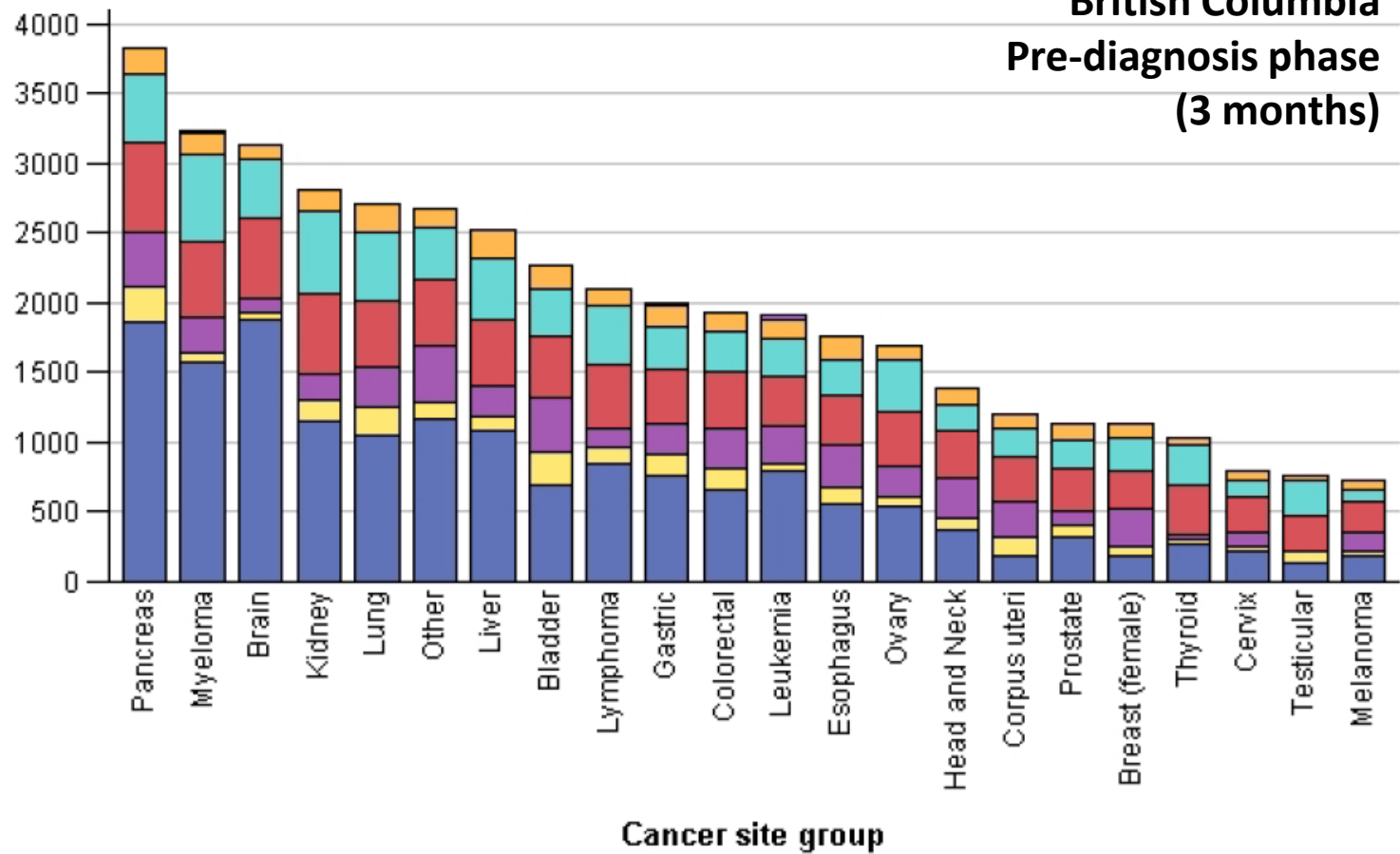
		Ontario	BC
I.V. drugs	New, ↑ \$	NDFP	BCCA
	Old, ↓ \$	NACRS (RIW)	BCCA
Oral drugs	< 65 yrs	ODB*	BCCA
	≥ 65 yrs	ODB	BCCA

- Chemotherapy delivery cost:
 - ON: visits identified in OHIP and NACRS; costs from NACRS
 - BC: delivery at BCCA sites is in data, others missing
- Hospitalization cost:
 - Same method, but total cost is very sensitive to assumptions about cost per weighted case

PRE-DIAGNOSIS	British Columbia		Ontario	
	Mean	95% CI	Mean	95% CI
Bladder	\$2,279	2,140-2,421	\$2,607	2,483-2,738
Brain	\$3,141	2,924-3,383	\$2,956	2,790-3,131
Breast (female)	\$1,132	1,098-1,167	\$1,817	1,707-1,934
 Cervix	\$791	686-900	\$1,314	1,242-1,390
Colorectal	\$1,928	1,870-1,990	\$2,533	2,411-2,662
Corpus uteri	\$1,209	1,130-1,288	\$1,848	1,732-1,970
Esophagus	\$1,758	1,592-1,937	\$2,313	2,175-2,459
Gastric	\$1,992	1,845-2,150	\$2,767	2,654-2,884
Head and Neck	\$1,396	1,290-1,507	\$1,663	1,496-1,848
Kidney	\$2,812	2,659-2,979	\$3,336	3,073-3,621
Leukemia	\$1,909	1,766-2,065	\$2,373	2,228-2,527
Liver	\$2,518	2,243-2,819	\$4,505	4,136-4,907
Lung	\$2,706	2,638-2,779	\$3,445	3,378-3,512
Lymphoma	\$2,107	2,000-2,226	\$2,812	2,710-2,918
 Melanoma	\$733	671-793	\$1,016	942-1,095
 Myeloma	\$3,240	2,991-3,517	\$4,660	4,463-4,866
Other	\$2,685	2,574-2,798	\$3,129	3,009-3,253
Ovary	\$1,693	1,557-1,835	\$2,653	2,571-2,738
 Pancreas	\$3,833	3,622-4,045	\$3,631	3,517-3,748
Prostate	\$1,140	1,104-1,178	\$1,636	1,546-1,730
Testicular	\$762	703-833	\$1,549	1,463-1,640
Thyroid	\$1,039	942-1,146	\$1,487	1,439-1,536

Cost (2009 CDN\$)

British Columbia
Pre-diagnosis phase
(3 months)



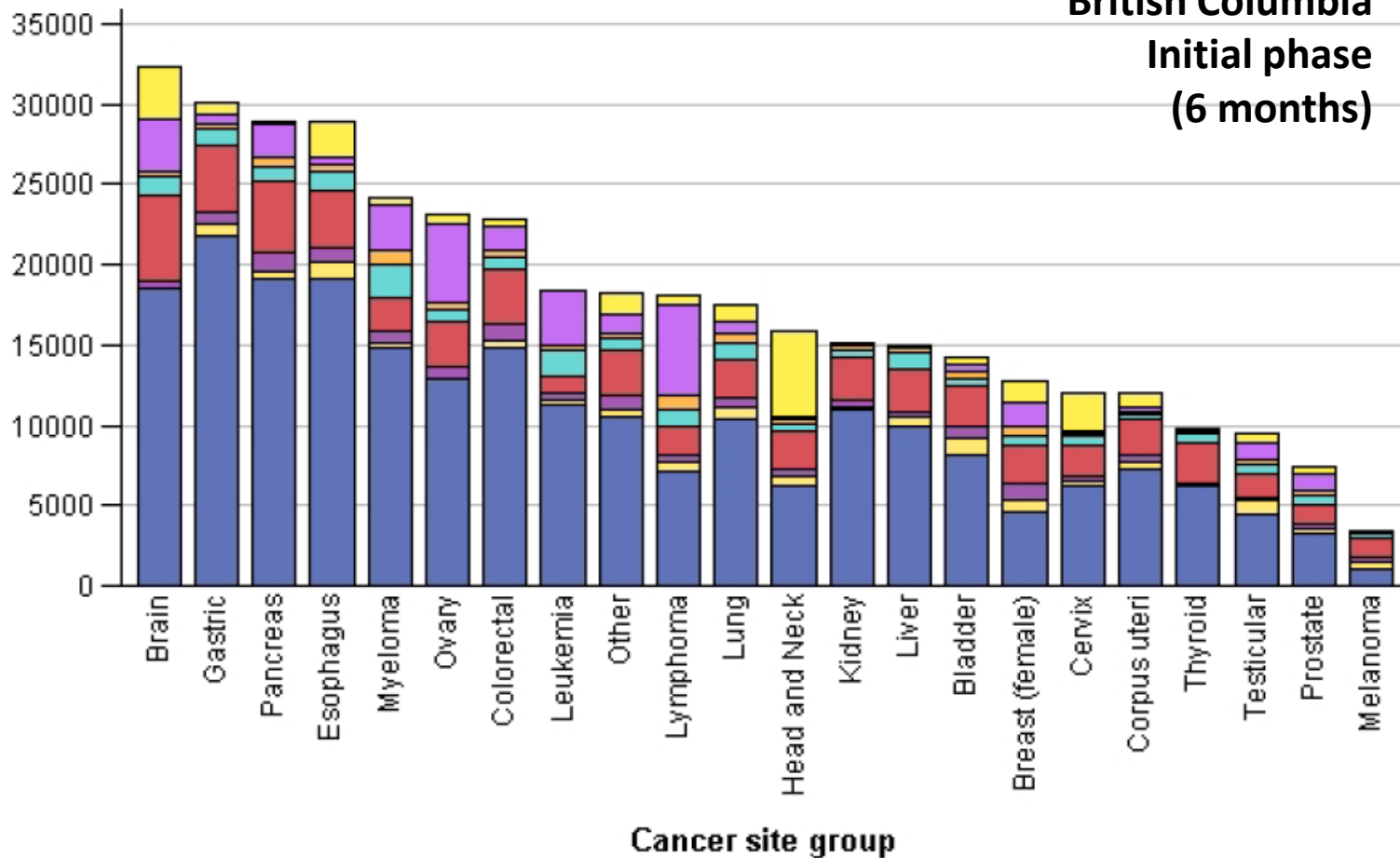
Cost components

- Inpatient
- Day surgery
- Home and community care
- Physician services
- Diagnostics
- PharmaCare
- Chemotherapy
- Radiotherapy

INITIAL PHASE	British Columbia		Ontario	
	Mean	95% CI	Mean	95% CI
Bladder	\$14,183	13,664-14,765	\$14,116	13,449-14,815
Brain	\$32,376	30,975-33,815	\$33,102	31,599-34,676
Breast (female)	\$12,751	12,655-12,852	\$13,188	12,986-13,393
Cervix	\$12,047	11,574-12,527	\$15,049	14,463-15,658
Colorectal	\$22,838	22,546-23,173	\$27,972	27,547-28,404
Corpus uteri	\$12,000	11,746-12,279	\$13,491	13,047-13,950
Esophagus	\$28,907	26,937-31,233	\$43,409	40,837-46,143
Gastric	\$30,060	28,455-31,862	\$34,588	33,195-36,041
Head and Neck	\$15,897	15,318-16,538	\$21,070	20,294-21,875
Kidney	\$15,159	14,622-15,770	\$17,763	17,198-18,345
Leukemia	\$18,406	17,374-19,599	\$22,682	21,381-24,063
Liver	\$14,998	13,238-16,780	\$23,882	22,131-25,772
Lung	\$17,451	17,084-17,827	\$23,957	23,526-24,397
Lymphoma	\$18,090	17,522-18,674	\$19,380	18,765-20,015
Melanoma	\$3,422	3,281-3,570	\$5,250	4,974-5,541
Myeloma	\$24,182	22,685-25,801	\$27,049	25,109-29,138
Other	\$18,256	17,727-18,834	\$20,981	20,338-21,644
Ovary	\$23,059	22,322-23,823	\$24,429	23,567-25,322
Pancreas	\$28,906	26,903-31,458	\$33,710	32,278-35,206
Prostate	\$7,466	7,372-7,564	\$9,751	9,604-9,901
Testicular	\$9,531	8,384-11,110	\$11,560	10,615-12,589
Thyroid	\$9,834	9,443-10,281	\$9,941	9,673-10,217




Cost (2009 CDN\$)

British Columbia
Initial phase
(6 months)



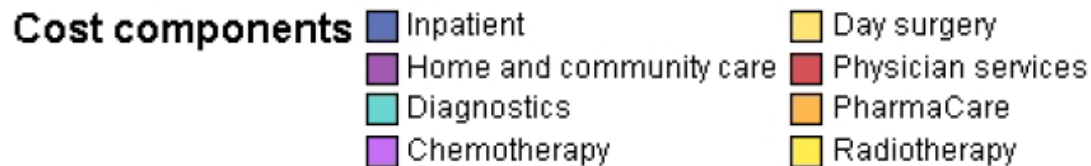
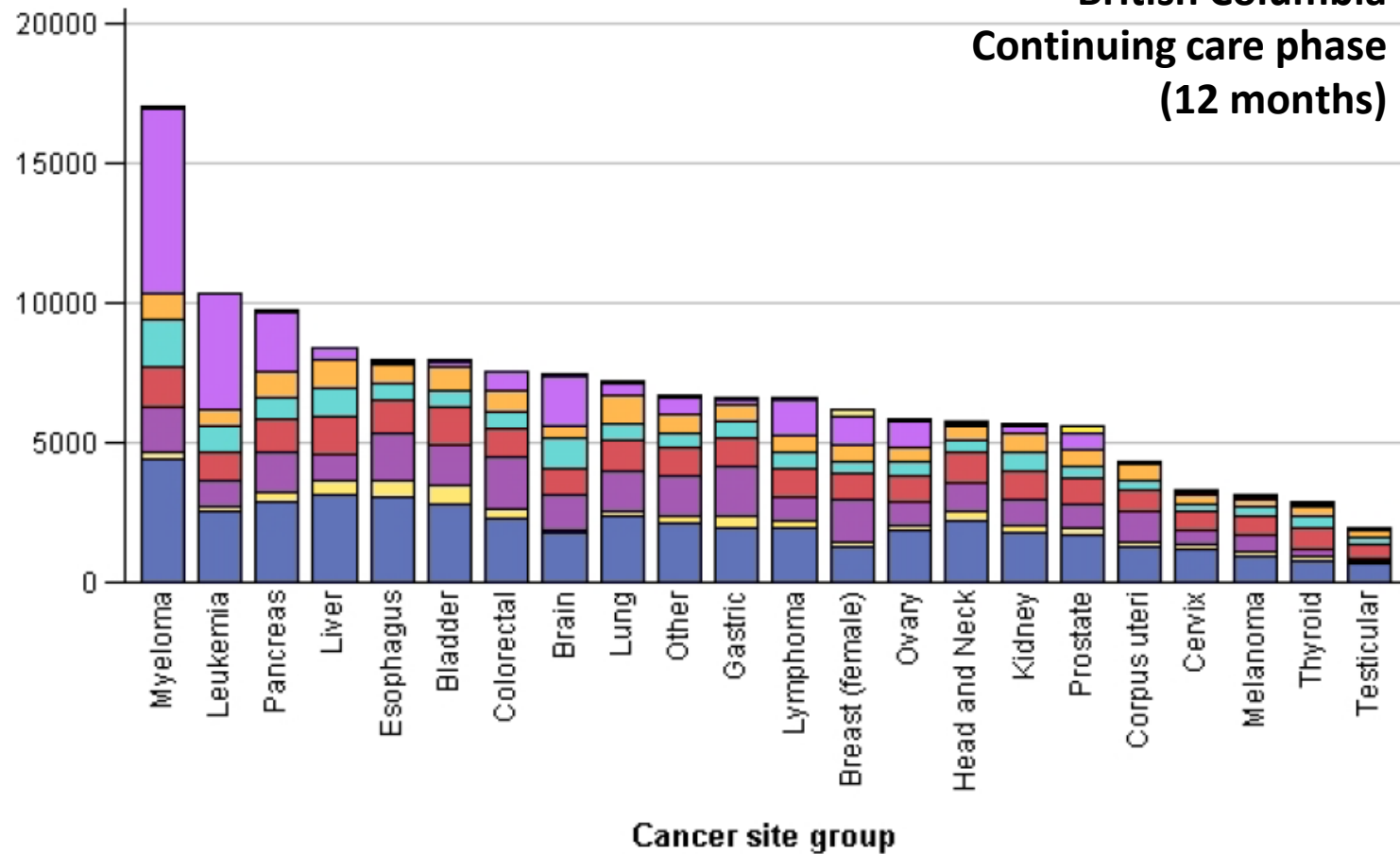
Cost components

- Inpatient
- Home and community care
- Diagnostics
- Chemotherapy
- Day surgery
- Physician services
- PharmaCare
- Radiotherapy

CONTINUING CARE	British Columbia		Ontario	
	Mean	95% CI	Mean	95% CI
Bladder	\$7,960	7,580-8,347	\$11,004	10,568-11,457
Brain	\$7,490	6,670-8,450	\$10,169	8,899-11,620
Breast (female)	\$6,197	6,087-6,313	\$9,041	8,874-9,210
Cervix	\$3,266	2,897-3,690	\$4,308	3,959-4,688
Colorectal	\$7,529	7,355-7,696	\$11,688	11,429-11,953
Corpus uteri	\$4,319	4,090-4,557	\$7,666	7,261-8,094
Esophagus	\$7,964	6,850-9,320	\$10,265	9,073-11,613
Gastric	\$6,573	5,883-7,307	\$9,291	8,602-10,035
Head and Neck	\$5,744	5,440-6,094	\$8,576	8,140-9,034
Kidney	\$5,633	5,270-5,997	\$9,228	8,805-9,672
Leukemia	\$10,306	9,764-10,857	\$11,500	10,942-12,086
Liver	\$8,405	7,300-9,611	\$14,708	13,556-15,958
Lung	\$7,182	6,891-7,491	\$10,090	9,737-10,456
Lymphoma	\$6,571	6,347-6,806	\$8,891	8,554-9,241
Melanoma	\$3,092	2,925-3,273	\$5,584	5,323-5,857
 Myeloma	\$16,992	15,993-18,029	\$19,340	18,570-20,142
Other	\$6,715	6,405-7,019	\$10,288	9,900-10,692
Ovary	\$5,805	5,367-6,301	\$7,631	7,085-8,220
Pancreas	\$9,721	8,102-11,697	\$10,889	9,401-12,613
Prostate	\$5,630	5,539-5,723	\$8,506	8,358-8,656
 Testicular	\$1,978	1,703-2,329	\$2,858	2,713-3,010
 Thyroid	\$2,841	2,644-3,074	\$4,886	4,673-5,109

Cost (2009 CDN\$)

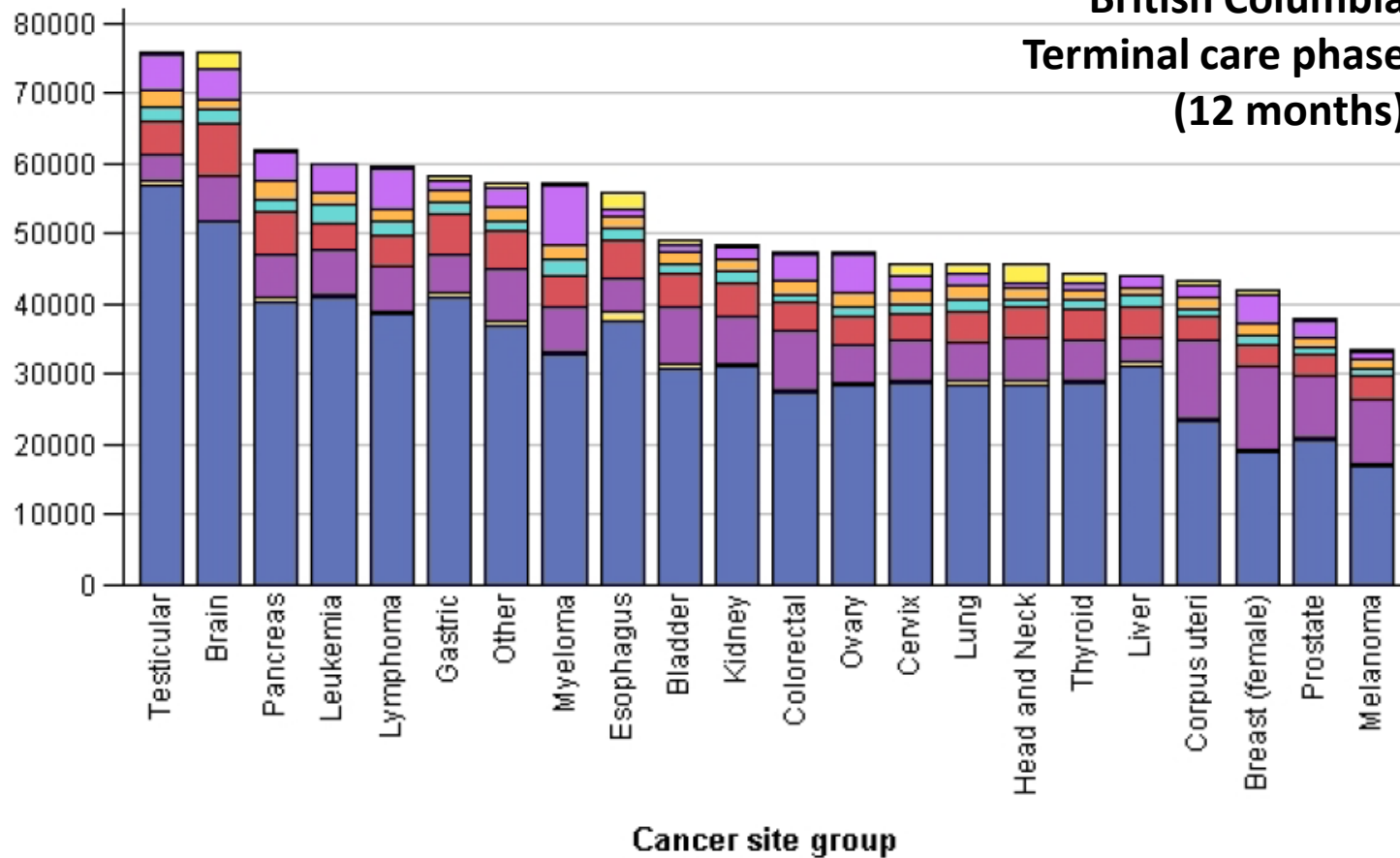
**British Columbia
Continuing care phase
(12 months)**



TERMINAL	British Columbia		Ontario	
	Mean	95% CI	Mean	95% CI
Bladder	\$49,021	47,315-50,934	\$57,121	55,856-58,416
Brain	\$75,950	72,872-79,105	\$86,153	83,702-88,675
Breast (female)	\$41,919	41,015-42,802	\$45,357	44,775-45,946
Cervix	\$45,856	42,483-49,715	\$55,774	53,171-58,504
Colorectal	\$47,504	46,571-48,391	\$54,589	53,980-55,204
Corpus uteri	\$43,221	40,750-45,901	\$47,823	45,994-49,724
Esophagus	\$55,762	53,094-58,599	\$70,894	68,520-73,352
Gastric	\$58,410	56,055-61,126	\$69,581	67,774-71,436
Head and Neck	\$45,612	43,534-47,811	\$57,191	55,680-58,743
Kidney	\$48,562	46,126-50,742	\$59,707	57,832-61,642
Leukemia	\$60,007	57,466-62,737	\$89,544	86,733-92,446
Liver	\$44,047	41,250-47,626	\$51,760	49,143-54,517
Lung	\$45,862	45,179-46,568	\$58,570	57,956-59,191
Lymphoma	\$59,579	57,477-61,746	\$72,821	70,740-74,962
Melanoma	\$33,632	31,973-35,406	\$39,645	38,547-40,774
Myeloma	\$57,329	55,007-60,173	\$69,751	67,673-71,893
Other	\$57,433	55,962-58,932	\$62,542	61,451-63,652
Ovary	\$47,300	45,327-49,383	\$58,094	56,711-59,510
Pancreas	\$61,931	59,918-64,026	\$70,305	68,646-72,003
Prostate	\$37,895	37,087-38,717	\$44,222	43,592-44,862
Testicular	\$75,911	38,140-140,149	\$74,558	63,662-87,318
Thyroid	\$44,327	37,029-51,841	\$55,016	50,260-60,222

Cost (2009 CDN\$)

**British Columbia
Terminal care phase
(12 months)**



Cost components

- Inpatient
- Home and community care
- Diagnostics
- Physician services
- PharmaCare
- Radiotherapy
- Chemotherapy

Patterns by phase and site

- Same sites consistently high
 - myeloma, pancreas, brain
- ...or low across phases
 - melanoma, cervix, prostate
- High initial-phase costs for aggressive cancers but not necessarily terminal phase
 - Cost of dying is consistently high
- Phases not appropriate for all cancers

Patterns in BC and Ontario

- Cost estimates tend to be lower for BC
- Unavoidable differences in costing methods
 - Some can be accommodated by comparing component costs
- Separating true differences across provinces from differences in methods is challenging

Conclusions

- Population-based admin data well-suited to costing studies
 - Analysis of cost trajectories, patterns
 - Inputs for future economic evaluation
- Aligning service definitions and component costs is a foundational step
- Familiarity with the data is essential!
 - ICES, Population Data BC

Thank you

- Contact: rpataky@bccrc.ca
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