

# Phase-specific Costs of Cancer Care in Ontario

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**Claire de Oliveira, M.A. PhD**

## Background

- Cancer: leading cause of death in Canada with costly implications for government and patients
- Cost estimates of cancer care are useful to inform/help formulate national cancer programs/policies and decisions around resource allocation
- Important input for economic evaluations

## Objective

- Estimate phase-specific costs of care for 21 most prevalent cancers, and remaining tumour sites combined, in Ontario

# Methods

**Period of analysis:** diagnosis between 1997-2007

**Cohort Selection:** Ontario Cancer Registry

- Included:
  - 19+ years of age
  - assigned a single, valid ICD-O topography code corresponding to primary cancer diagnosis
  - no second cancer diagnosed within 90 days of initial cancer diagnosis
  - survived  $\geq 30$  days after initial diagnosis
- Excluded:
  - missing, unusual or incorrect histology codes

## Final sample:

- N = 402,399 patients

Patients classified into one of following 21 cancers  
(22<sup>nd</sup> category - all other tumour sites combined):

brain

female breast

cervix

colorectal

corpus uteri

esophagus

gastric

head and neck

leukemia

liver

lung

lymphoma

melanoma

multiple myeloma

ovary

pancreas

prostate

renal

testis

thyroid

urinary bladder

## Databases and Resources:

Database*	Resources
New Drug Funding Program	Chemotherapy drugs
Activity Level Reporting System	Radiotherapy
OHIP Claims History Database	Diagnostic tests, physician services, chemotherapy visits before 2002, emergency department visits before 2002
Ontario Drug Benefit Program	Outpatient prescription drugs for patients aged $\geq 65$ years, long-term care indicator
CIHI Discharge Abstract Database	Inpatient hospital admissions, same-day surgery before 2002
CIHI National Ambulatory Care Reporting System	Chemotherapy visits after 2002, emergency department visits after 2002, same-day surgery after 2002
Continuing Care Reporting System	Stays in complex continuing care facilities
Ontario Home Care Administrative System	Home care before April 2005
Home Care Database	Home care after April 2005
<p>CIHI = Canadian Institute for Health Information, OHIP = Ontario Health Insurance Plan.            *All databases were available through the Institute for Clinical Evaluative Sciences, with the exception of the New Drug Funding Program and Activity Level Reporting System obtained from Cancer Care Ontario.</p>	

## Estimation of direct medical costs of care

**Phase of care approach:** assigns observation time and respective costs into distinct clinical phases

- Typically cancer curves have U-shape → 3 phases

### Phases:

- Pre-diagnosis phase of care (3 months pre-diagnosis)
- Initial phase of care (6 months post-diagnosis)
- Terminal phase of care (12 months pre-death)
- Continuing phase of care (all time in between; expressed as annual value)
  - Definition of phase length based on data, other studies and clinical judgment

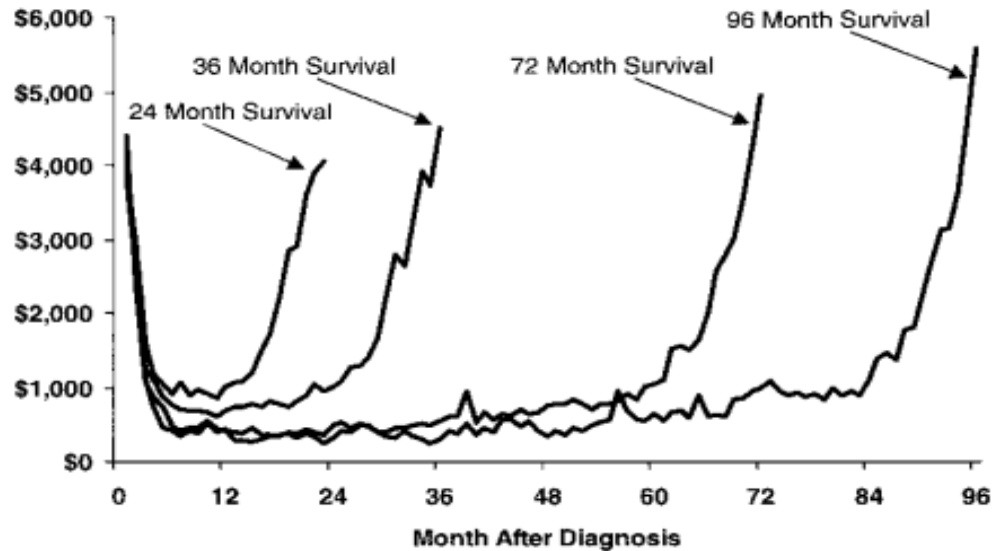
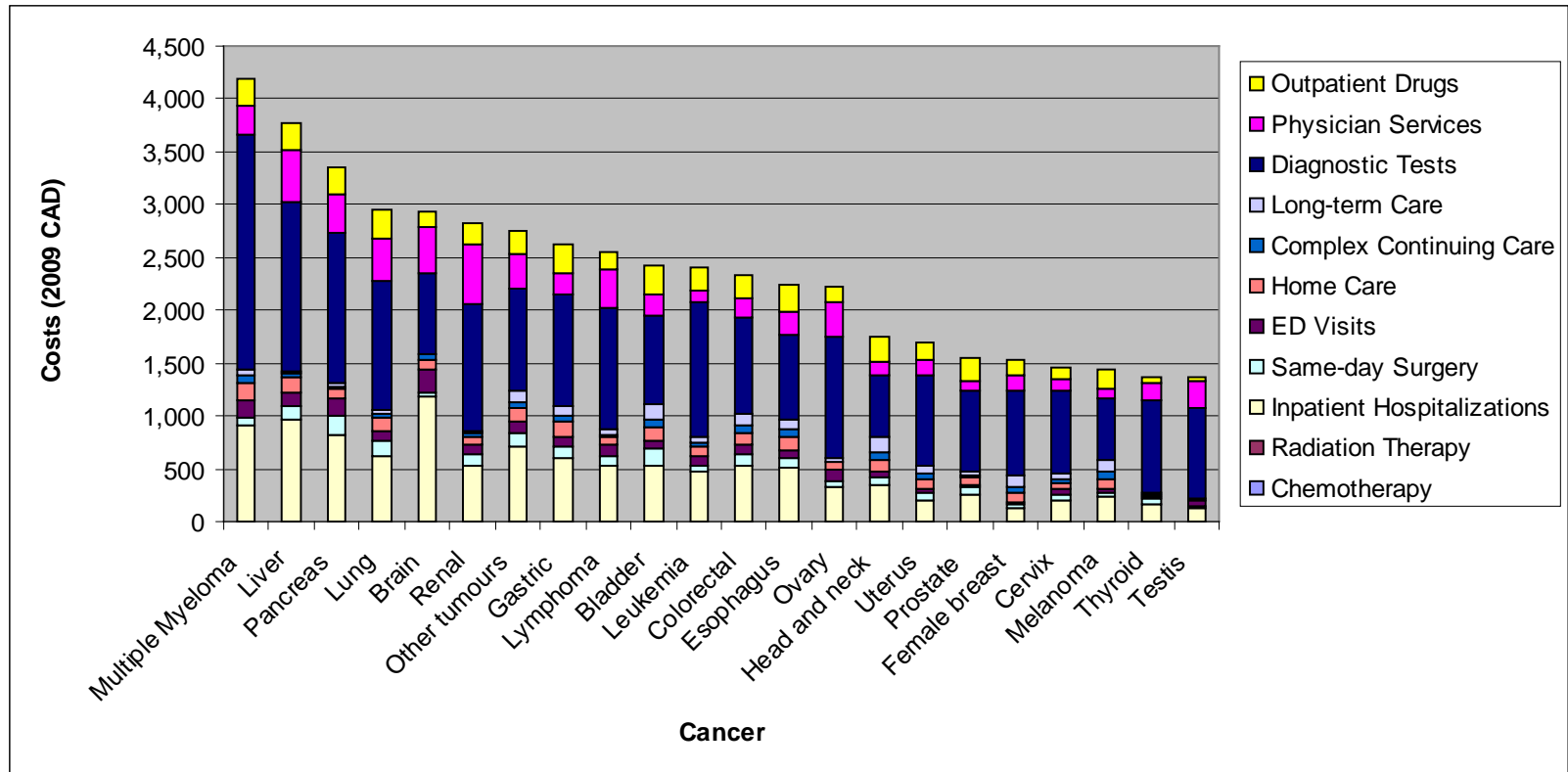


FIG. 1. Average monthly Medicare payments for breast cancer by survival time according to SEER-Medicare data from 1990 to 1998.

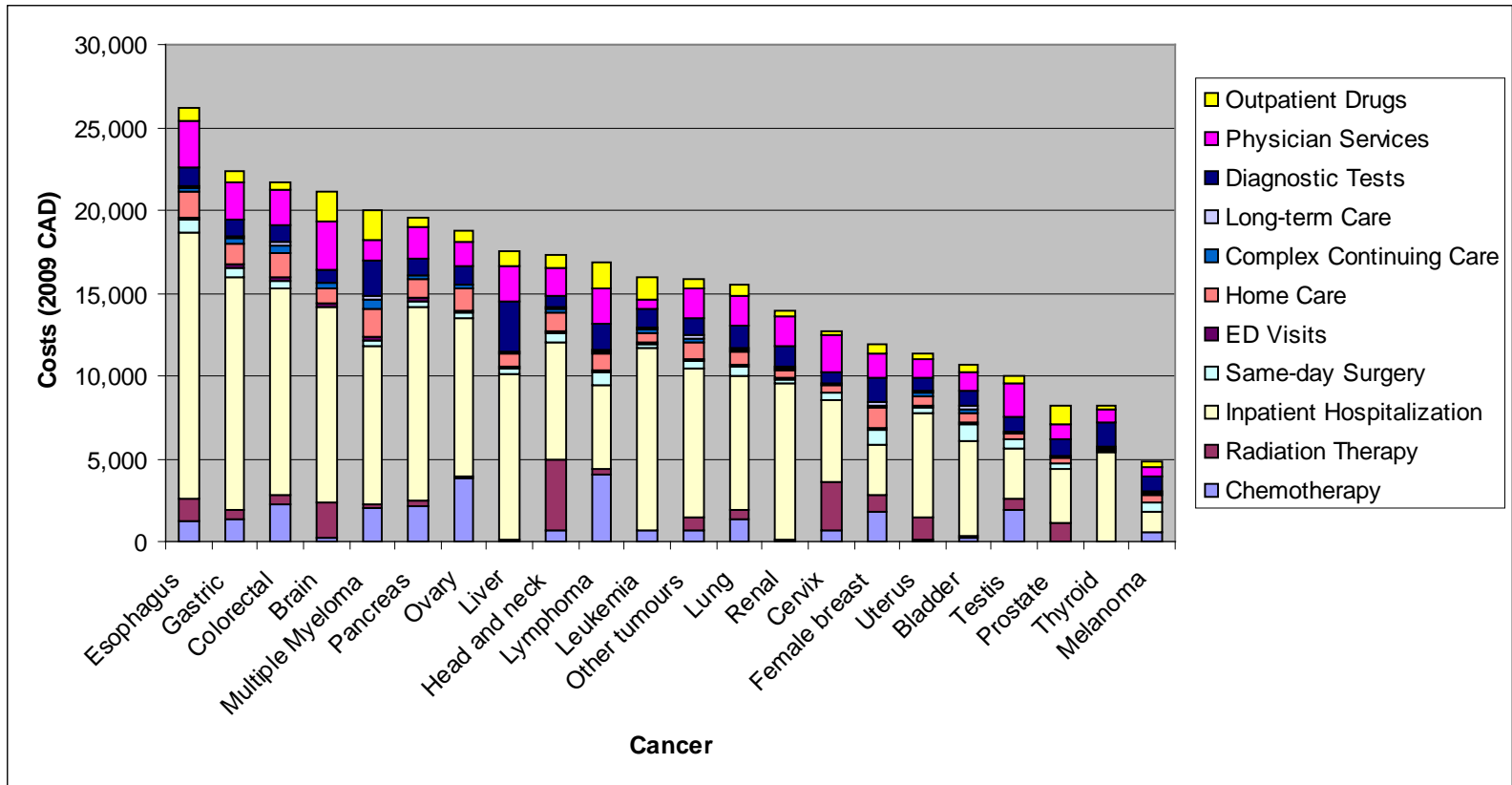
Source: Brown et al, Medical Care 2002

## Pre-diagnosis phase

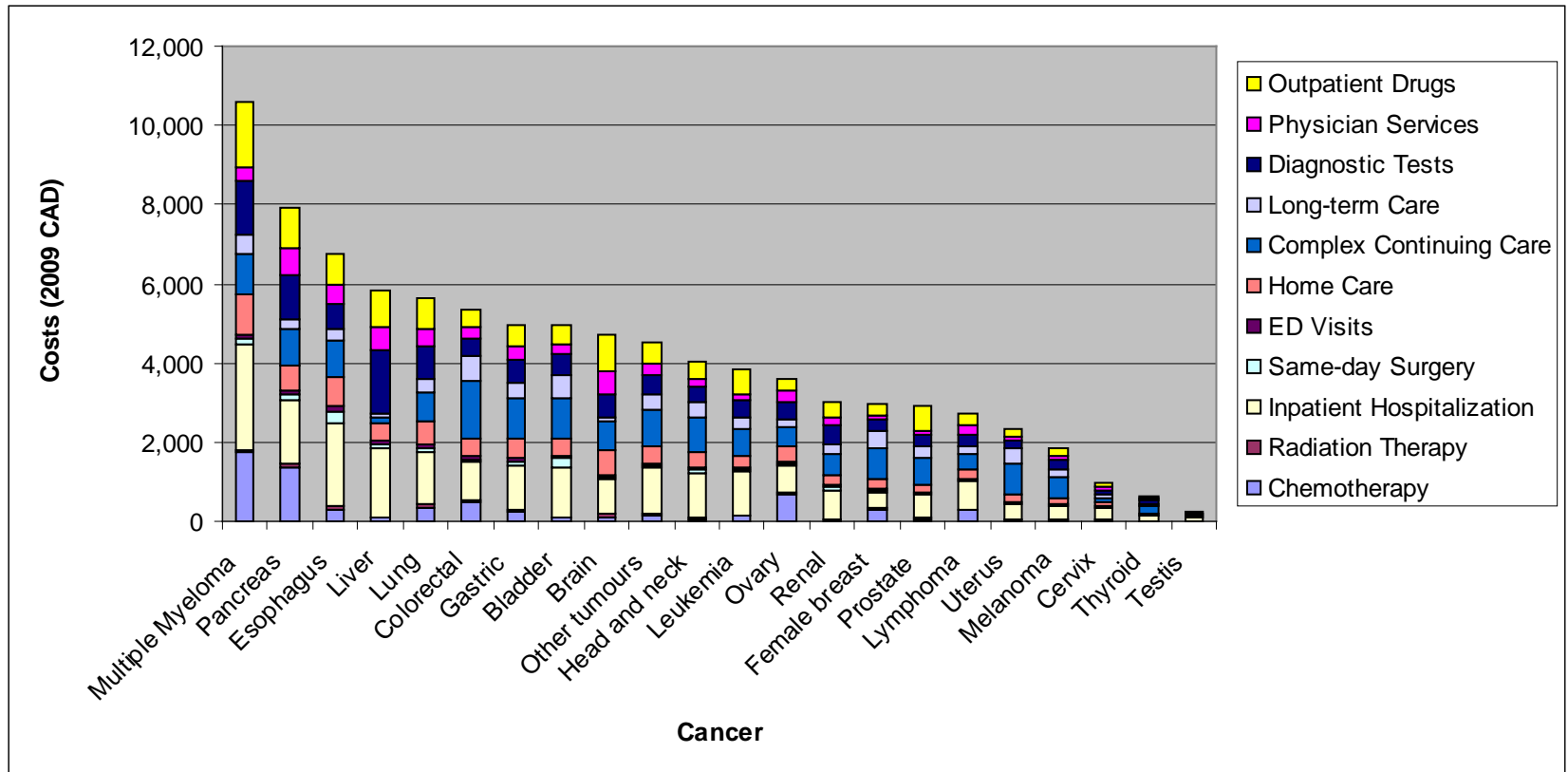




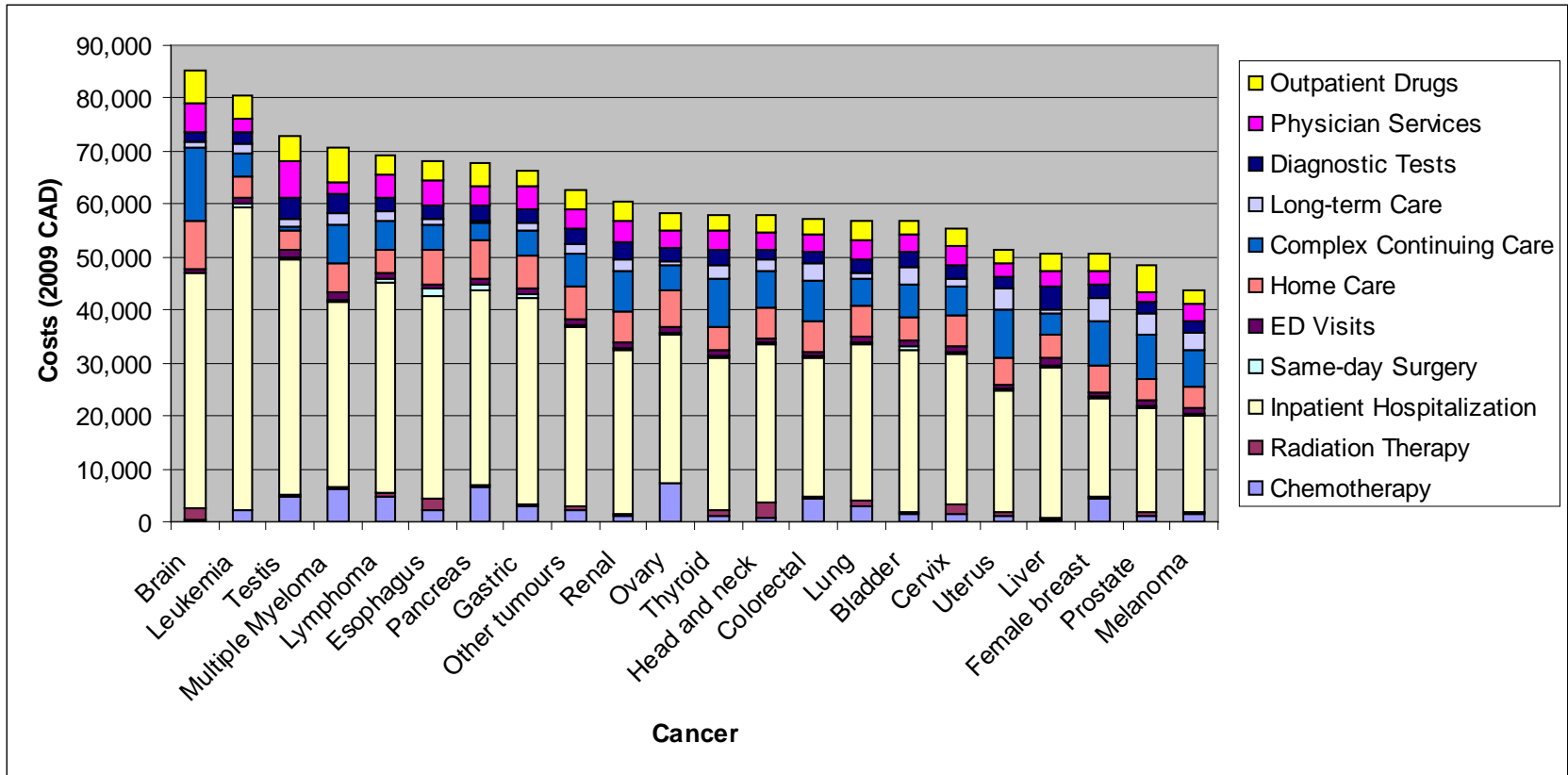
## Initial phase



## Continuing phase



# Terminal phase



## Results

- Mean direct costs of care: highest in the initial and terminal phases
- Pre-diagnosis phase
  - Highest: multiple myeloma, liver, pancreas
  - Lowest: melanoma, thyroid, testis
- Initial phase
  - Highest: esophagus, gastric, colorectal, brain
  - Lowest: testis, prostate, thyroid, melanoma
- Continuing phase
  - Highest: multiple myeloma, pancreas, esophagus
  - Lowest: melanoma, cervix, thyroid, testis
- Terminal phase
  - Highest: brain, leukemia, testis, multiple myeloma
  - Lowest: female breast, prostate, melanoma

## Results

- Hospitalizations make up most of the cost
- Pre-diagnosis phase
  - Highest: diagnostic tests, hospitalizations, physician services
  - Lowest: complex continuing care, long-term care
- Initial phase
  - Highest: hospitalizations, physician services, diagnostic tests
  - Lowest: long-term care, ED visits
- Continuing phase
  - Highest: hospitalizations, complex continuing care, outpatient drugs
  - Lowest: ED visits, same-day surgery
- Terminal phase
  - Highest: hospitalizations, complex continuing care, home care
  - Lowest: same-day surgery, radiation therapy, ED visits

## Results

Comparison with the US (net costs, patients 65+)

- Costs highest for terminal phase, then initial phase
- Initial phase of care costs also highest for esophageal and gastric cancers and lowest for melanoma and prostate
- Continuing phase of care costs also lowest for cervical cancer and melanoma
- Terminal phase of care costs also highest for brain and leukemia and lowest for melanoma
- Hospitalizations also account for the bulk of total cost of cancer care

## Conclusions

- Costs of cancer care in Ontario are substantial and vary by tumour site and phase of care
  - generally highest for multiple myeloma (also pancreas, esophagus, brain)
  - generally lowest for melanoma (also thyroid, testis)
- Inpatient hospitalizations comprise largest portion of cost of care for all cancers
- Results largely in agreement with previous research for Medicare patients in the US

## Policy implications

- Estimates useful for planning future cancer care budgets and setting priorities for resource allocation
- Improve quality of future cancer-related economic evaluations
  - value to researchers and decision makers

## Next Steps

- Net costs of care
- Aggregate 5-year net costs of care
- Lifetime costs of care
- Predictors of care



## Authors:

- Claire de Oliveira, UHN
- Karen Bremner, UHN
- Reka Pataky BCCA
- Mahbubul Haq, ICES
- Nadia Gunraj, ICES
- Kelvin Chan, Sunnybrook Health Sciences Centre
- Winson Cheung, BCCA
- Paulos Teckle, BCCA
- Jeffrey Hoch, CCO/St. Michael's Hospital
- Stuart Peacock, BCCA
- Murray Krahn, UHN/THETA

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### **Contact information:**

Claire de Oliveira, M.A., PhD  
cdeoliv@uhnresearch.ca