

Population-based studies on Health care at the End-of-life

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CAHSPR Presentation

May 2015

HSPRN

- Health System Performance Research Network (HSPRN)
- Currently funded by an Ontario MOHLTC Grant
- Network of researchers who work closely with policy/provider decision-makers to find ways to better manage the health system
- Focus: complex individuals who require care from many different providers
 - youth transitioning to adulthood, younger and mid-life adults, older adults with multi-morbidity

Background

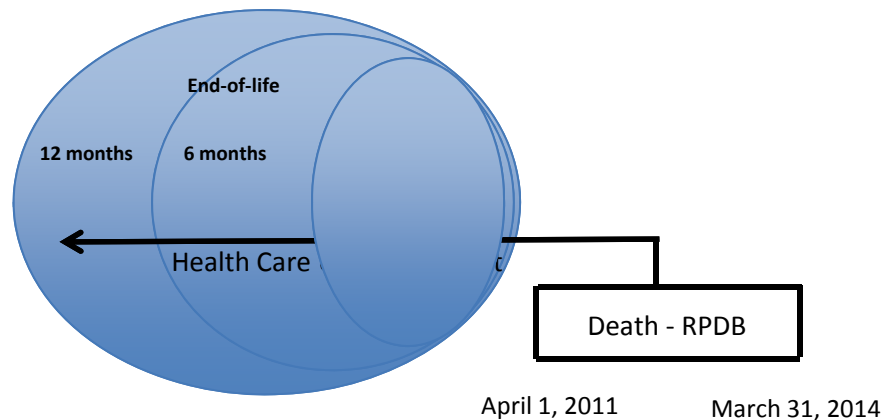
- Aging population
 - Decreasing birth rate
 - Extension of life expectancy
 - Aging of baby boomers
- Concerns regarding sustainability of health care system
- As population ages concerns about the need for additional resources – both in acute care & continuing care sector; but.....

Research Questions

- 1) Is this concern justified in Ontario/Canada?
- 2) What is the relative cost of acute care, continuing care, and outpatient care at the end of life?
- 3) Beyond costs, what can we say about:
 - Where the population is dying
 - Where the population is spending their last days of life

EOL Cohort – Approach

- Retrospective cohort approach
- All deaths in Ontario between Fiscal Year 2011 to 2013: 264,755 deaths
- 12 month look back



Methods – Data Sources

- Looked across all health sectors available at ICES
- Linked at the individual level across broad health care sectors
 - “Continuing care”: Long-term care (LTC), complex continuing care (CCC), Home care, Rehab
 - “Acute care”: Hospital admission, Intensive Care Unit (ICU), Emergency Room (ER)
 - “Outpatient care”: Physician visits/claims, outpatient hospital visits, select: drugs, non-physician, labs, devices


“Last month of life costs health-care system \$14K on average: report”



The Health Care Cost of Dying: A Population-Based Retrospective Cohort Study of the Last Year of Life in Ontario, Canada

Peter Tanuseputro^{1,2,3}, Walter P Wodchis^{3,4,8}, Rob Fowler⁵, Peter Walker¹, Yu Qing Bai⁴, Sue E. Bronskill^{3,4}, Douglas Manuel^{1,2,3,6,7}





A population-based examination of interventions near the end-of-life and their effect on location of death

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Location of Death

- Interaction between illness, individual, and environment
- Influenced by:
 - Socioeconomic characteristics
 - Available support networks
 - Functional needs
 - Care needs
 - Healthcare system

- Many interventions are geared towards shifting care away from inappropriate settings
- Examine where people are dying
 - Most express desire to die at home

Methods

- Retrospective cohort study
- FY: 2010 to 2012
- 5 locations:
 - “Institution”: Acute care, CCC, Rehab
 - “Home”: **LTC**, Home Care, Other

Location of Death – Overall

Location of Death	Number	%
Acute Care	120,984	45.7%
Complex Continuing Care	20,259	7.7%
Rehab	421	0.2%
Long-term Care	46,165	17.4%
Home Care	27,916	10.5%
Other	49,010	18.5%
Institution	141,664	53.5%
Home	123,091	46.5%
Total	264,755	100.0%

Location of Death - Predictors

Proportion dying in an institution by...

- Age: Lowest at extremes of age:
 - 43% (<45 yrs) → 60% (65-85) → 34% (95+)
- Time: 54.4% (2010) → 51.9% (2013)
- Chronic conditions
 - CHF, COPD, Cancer: 62%
 - Dementia: 39%

Location of Death - Predictors

- LHIN's:
 - Range: 45% to 60%
 - Champlain: 45%
- Those receiving Home Care in last 90 days:
 - 61% die in Institution
 - With palliative care (SRC 95 – end-of-life): 43%

Multivariable Model

- Outcome: **Risk of dying in an institution**
(Acute care, CCC, Rehab)
- Adjusts for: Age, sex, income quintile, year, rurality, ADG score (Austin, van Walraven et al.)

Multivariable models

- Main 'exposures' of interest:
 - 1) Physician home visits*
 - 2) Palliative home care visits
 - 3) Rostering to family physician

*Adjust for home 1 week prior to death, and number of days at home in last 90 days

- Geographic variations
 - LHIN (compared to best performing): 2 at 80% higher, 1 at 100% higher risk

Multivariable Model

Reference Value	Parameter Variable	HR	Risk limits		Sig
Ages <19	19-44	0.419	0.37	0.476	<.0001
	45-54	0.486	0.431	0.548	<.0001
	55-64	0.521	0.464	0.586	<.0001
	65-74	0.518	0.462	0.581	<.0001
	75-84	0.426	0.38	0.477	<.0001
	85-94	0.308	0.275	0.346	<.0001
	95+	0.229	0.203	0.258	<.0001
Sex - Male	Sex - Female	0.914	0.895	0.934	<.0001
Income Quintile - Lowest	Low	1.029	0.997	1.062	0.0757
	Middle	0.988	0.956	1.02	0.4488
	High	0.949	0.919	0.981	0.0018
	Highest	0.985	0.953	1.018	0.3719
Rurality	Urban resident	1.005	0.976	1.035	0.7159
Year of Death - 2010	2011	0.926	0.901	0.953	<.0001
	2012	0.905	0.88	0.93	<.0001
	2013	0.898	0.862	0.935	<.0001
Primary Care Model - Rostered	Unrostered	1.316	1.284	1.349	<.0001
No Home Care In Past 365 Days	Home Care in past 365 days - Not Palliative	1.099	1.072	1.126	<.0001
	Home Care in past 365 days - Palliative	0.498	0.48	0.516	<.0001
0 Physician Home Visits	Non-Palliative Physician Home Visits	0.515	0.497	0.533	<.0001
	Palliative Physician Home Visits	0.408	0.391	0.426	<.0001
ADG Score		1.030	1.029	1.031	<.0001
Not at home 1 week before death	At home 1 week before death	0.496	0.479	0.515	<.0001
#Days at Home in the past month		0.839	0.837	0.842	<.0001

Multivariable Model

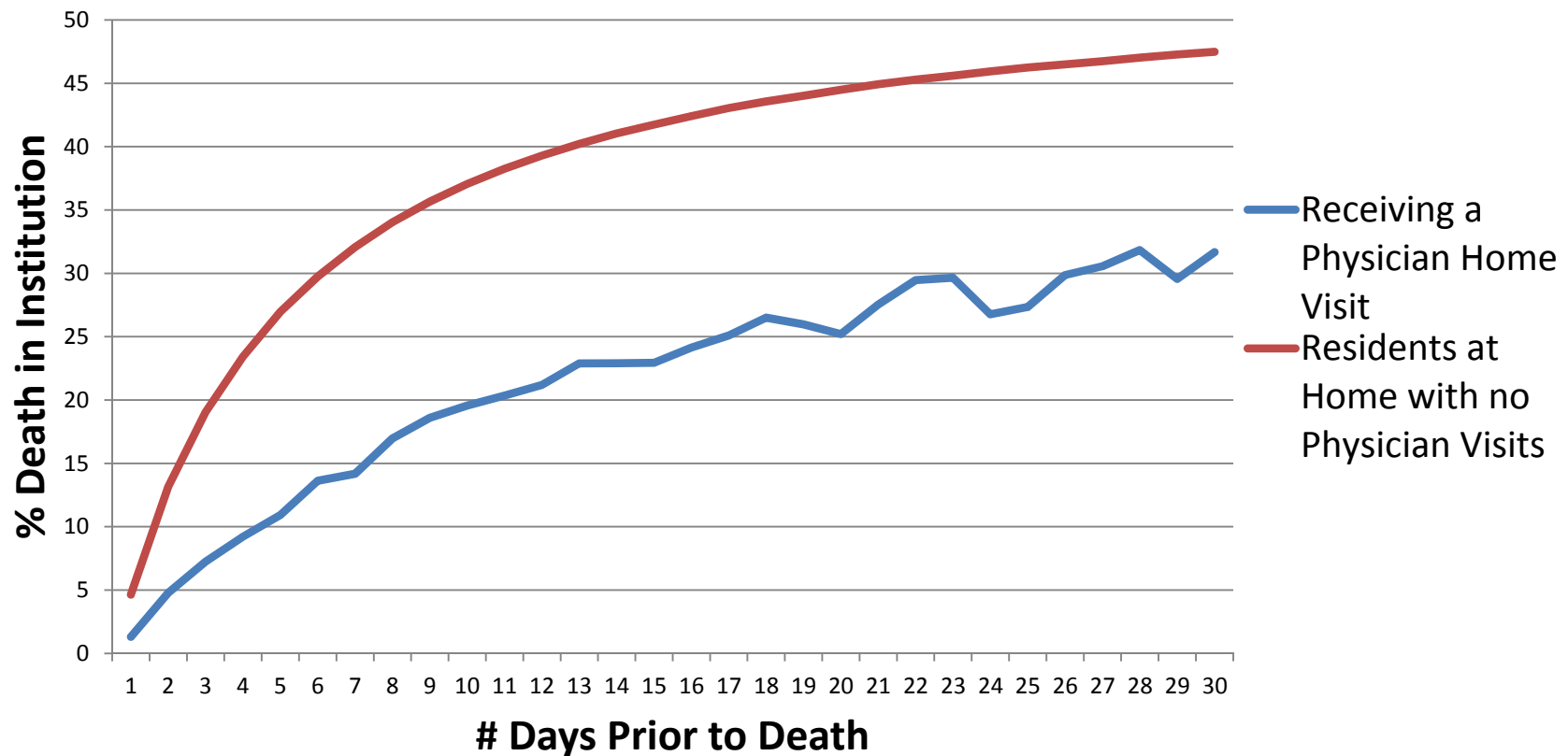
- 3) Rostering
 - Unrostered: 31.2% higher risk of institution death
 - 69,752 of 264,754 decedents = 26% of all decedents
- 2) Palliative home care
 - 50% lower risk
 - 48,583 of 160,793 home care recipients = 30%

Multivariable models

- 1) Physician home visits
 - About 50% lower risk when PC specialist not involved (Barbera et al.'s definition)
 - About 60% lower risk when PC specialist involved
 - What proportion receive visit in last year?
 - 20.6% of total population
 - 11.3% with no specialist, 9.3% with specialist

Physician home visits

Effect of Physician Home Visits by Day of Visit Prior to Death



Conclusions

- About half of Ontarians die in an acute care setting
 - More people are dying at “home” in recent years
- True that the sicker you are, the more likely you are to die in hospital but...
- LOD also determined by health system factors
 - LHINS
 - Palliative care home care
 - Primary care, including rostering & home visits



PLACES OF CARE: A POPULATION BASED EXAMINATION OF PREDICTORS TO WHERE PEOPLE SPEND THEIR LAST DAYS OF LIFE

Peter Tanuseputro & Sarah Beach

CAHSPR Presentation

May 2015



Places of Care

- Where people spend their last days, weeks, months of life
- Those dying at home can spend much of their EOL days in hospital & vice versa
- Main Outcomes: days spent in any health care institution in last 30 and 90 days

Places of Care

- FY: 2010 to 2012
- 5 “institution” locations:
 - 1) Acute care (separate out ALC),
 - 2) Complex Continuing Care
 - 3) Rehab
 - 4) Emergency Room
 - 5) Long-term care: **not** included in final models
- Similar predictors

Results - Overall

- Last 30 days (on average):
 - 15 days in any institution
 - 6 days in hospital (1 in ALC)
 - 6 days in LTC
 - 1.5 days in CCC
 - 1 day in ER
 - 0.2 days in rehab
 - 9 days in acute care institutions

Results – Last 90 days

- Last 90 days (on average):
 - 34 days in an institution
 - 10 days in Acute Care (2 in ALC)
 - 19 days in LTC
 - 3 in CCC
 - 2 in ER
 - 16 days in acute care institutions

Summary of Results

- NOT counting LTC, last 90 days
 - **16 days** in Acute Care Settings
 - By LHIN: Range from 14 to 20 days
 - Home care recipients: 21 days
- Build multivariate models.
- *Main outcome*: Number of acute care institution days in last 90 days of life

Multivariable model

- Model for accounting for:
 - Age, sex, neighborhood income quintile, rurality
 - # chronic conditions, cancer, use of LTC, ADG
 - Palliative home care, physician visits
- Main interventions:
 - Palliative home care
 - Physician home visits

Days in Institution; Home care

- 2 sets of models: 1 for home care recipients (half of decedents), 1 for all decedents

Reference Value	N	Parameter Variable	N	Hazard Ratio	p-value
Ages <19	464	19-44	2 296	-0.45138	0.7146
		45-54	6 275	-2.32849	0.0472
		55-64	14 767	-3.29047	0.0044
		65-74	24 195	-3.59789	0.0018
		75-84	41 229	-3.96172	0.0006
		85-94	38 850	-5.47635	<.0001
		95+	6 150	-7.96667	<.0001
Sex - Male	65 155	Sex - Female	69 073	0.43558	0.0008
Income Quintile - Lowest	29 354	Low	28 306	-0.36834	0.0587
		Middle	26 006	-0.64867	0.0012
		High	25 681	-0.63126	0.0017
		Highest	24 273	-1.10104	<.0001
Rurality	19 556	Urban resident	114 672	1.03007	<.0001

Results

Reference Value	N	Parameter Variable	N	Hazard Ratio	p-value
# of Chronic Conditions - 0 to 2	23 303	3	20 811	2.11398	<.0001
		4	22 527	3.17468	<.0001
		5	21 306	3.88783	<.0001
		6	18 273	4.91079	<.0001
		7+	28 008	6.45182	<.0001
Primary Care Model - Rostered	105 816	Unrostered	28 412	1.25892	<.0001
Never used LTC in past 90 days	119 280	Used LTC at some point in	14 948	-4.29309	<.0001
Does not have cancer	55 201	Has cancer	79 027	0.80111	<.0001

Results – Main exposures

Reference Value	N	Parameter Variable	N	Hazard Ratio	p-value
Never used palliative home care	87 614	Palliative home care initiated 0 - 1 month prior to death	12 636	-4.78837	<.0001
		Palliative home care initiated 1 - 3 months prior to death	12 518	-2.97009	<.0001
		Palliative home care initiated 3 - 6 months prior to death	7 830	-7.19408	<.0001
		Palliative home care initiated 6 - 12 months prior to death	6 561	-8.75253	<.0001
		Palliative home care initiated 12+ months prior to death	7 069	-9.03827	<.0001
0 Physician Home Visits	92024	1 Physician home visit	14667	-3.5651	<.0001
		2 Physician home visits	7647	-4.37355	<.0001
		3 - 4 Physician home visits	7995	-4.83842	<.0001
		5 - 6 Physician home visits	4030	-6.17563	<.0001
		7+ Physician home visits	7865	-6.97771	<.0001

Conclusions

- Ontarians spend significant number of days in institutions at the EOL
- Last 30 days, Ontarians spend:
 - 1 week in hospital; 50% in any institution
- Some important predictors:
 - Rostered to primary care physician
 - Receiving physician home visit
 - Receiving palliative home care

Conclusions

- Only a minority of the population receive palliative home care & physician home visits
- Even for those receiving home care:
 - 46,614 of 134,228 (35%) get palliative home care
 - 42,204 (31%) get a physician home visit in last yr
- **Room for improvement!**



THE END

QUESTIONS?



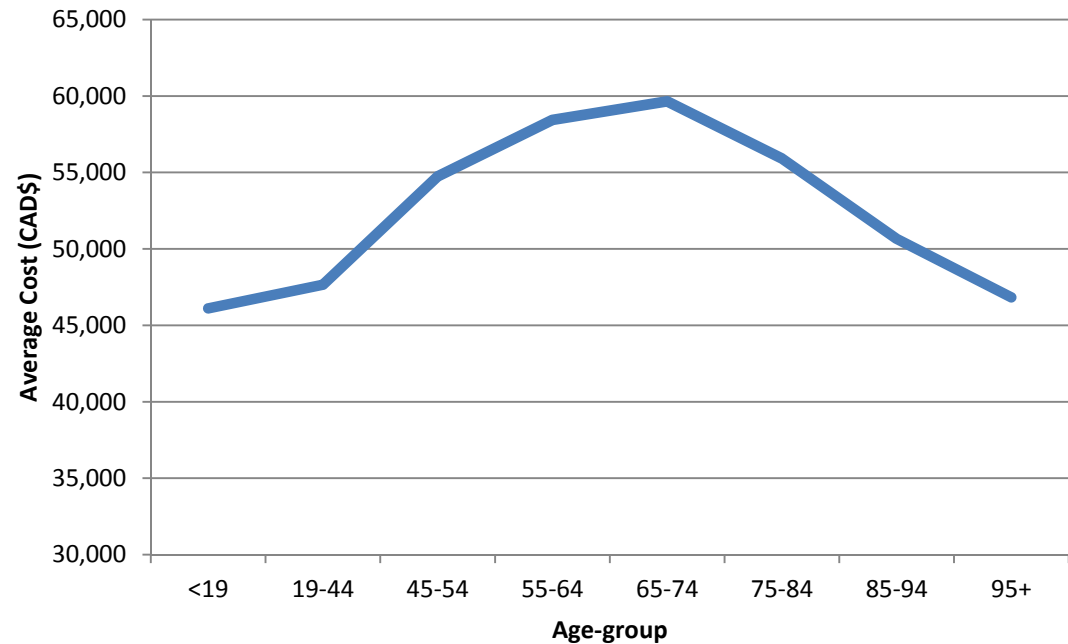
1. SYSTEM OVERVIEW OF END-OF-LIFE HEALTH CARE IN ONTARIO

Results – Average Cost

- Q: Average cost per decedent, in last 12 months of life?

- A) 10-40K
- B) 40-70K
- C) 70-100K
- D) 100+K

Answer: \$53,661



Results – Total Cost

EOL costs are significant:

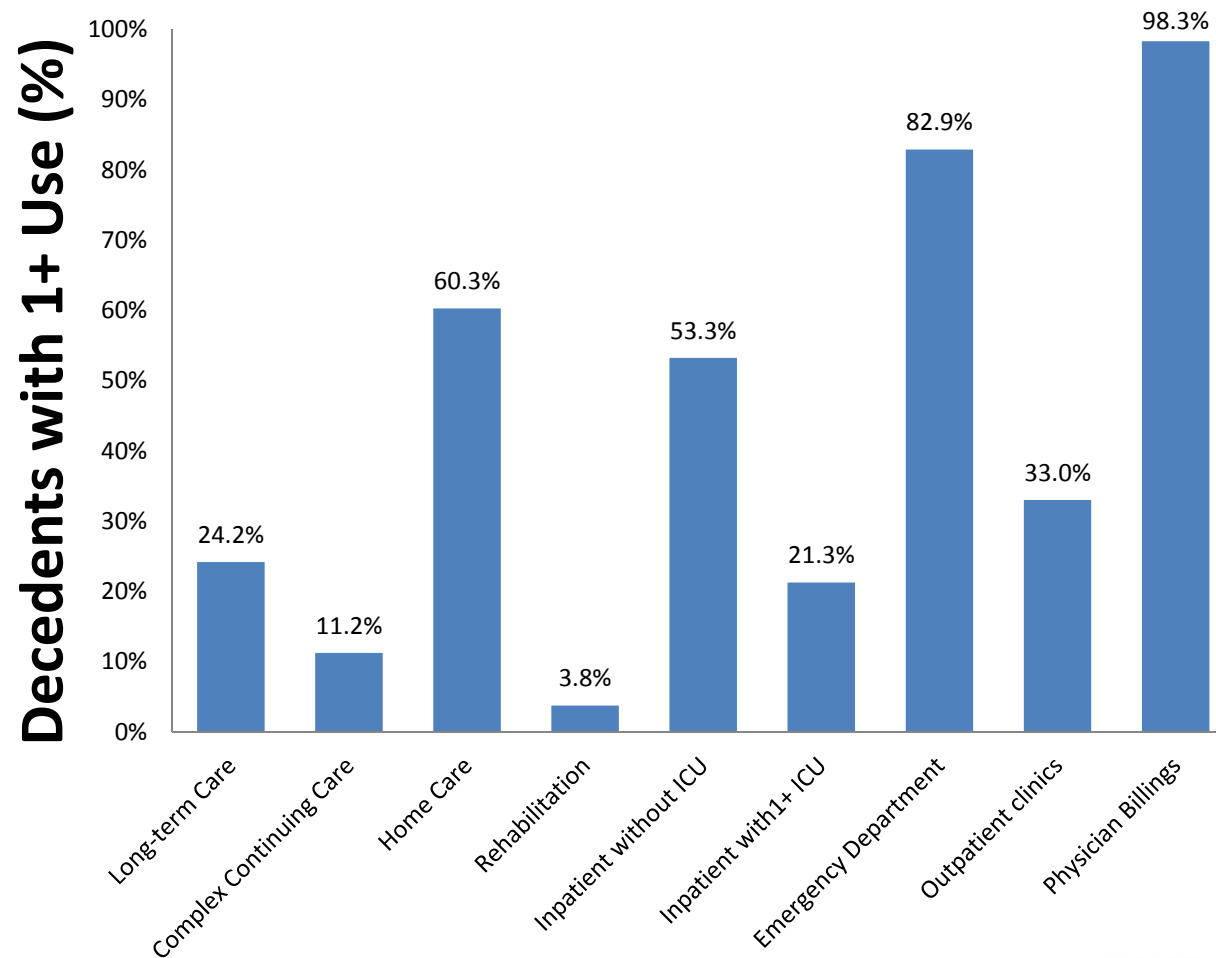
- Total annual cost of \$4.7 billion represents more than 10% of all government-funded health care.
- Likely under-representation (e.g., doesn't include some physician services, hospices, etc.)

Results – Use by sector

- Q: What proportion of Ontarians dying use LTC in their last year of life?
 - A) 20-30%
 - B) 30-40%
 - C) 40-50%
 - D) >50%

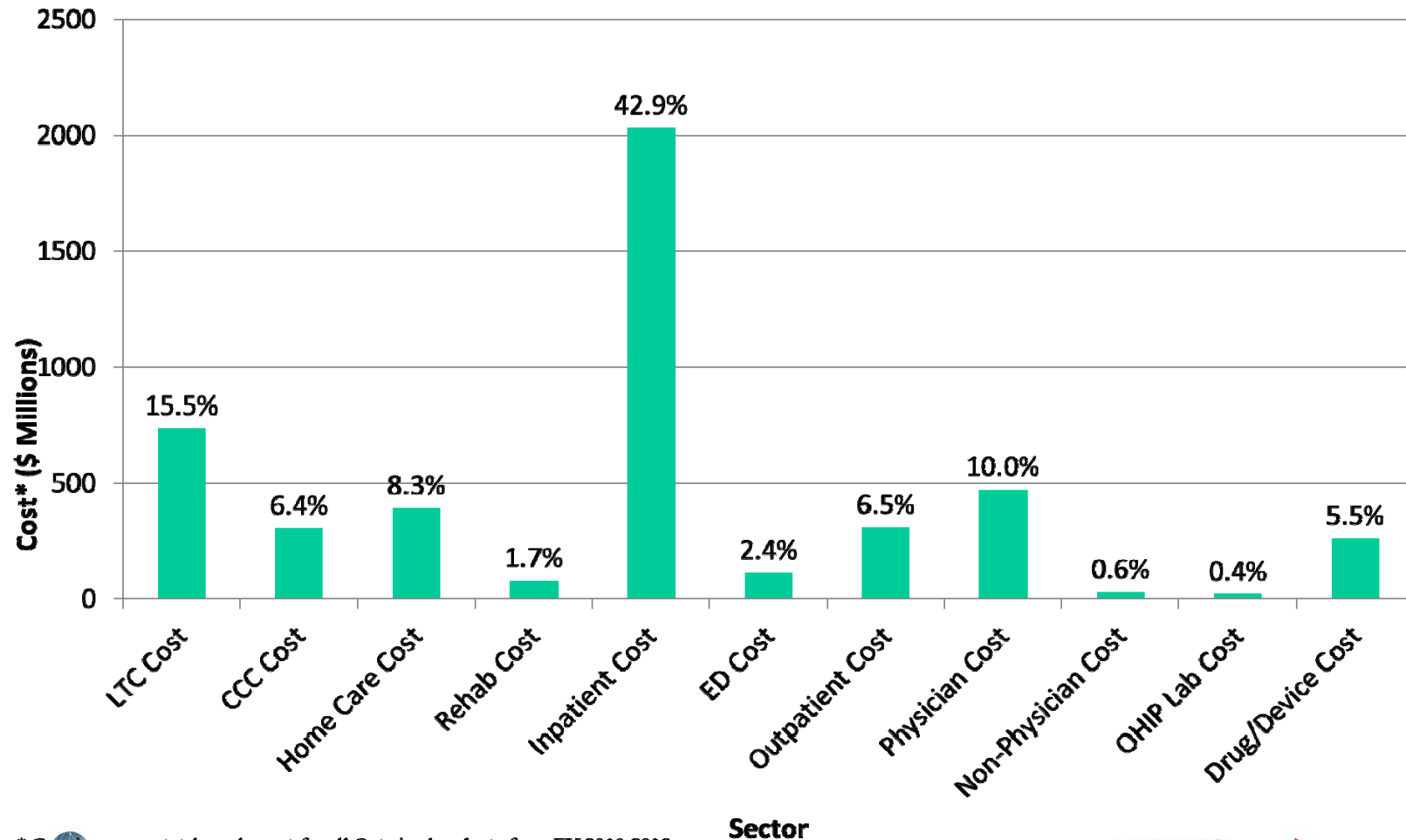
- Answer: 24%

Results – Use by sector



Total costs – Across all sectors

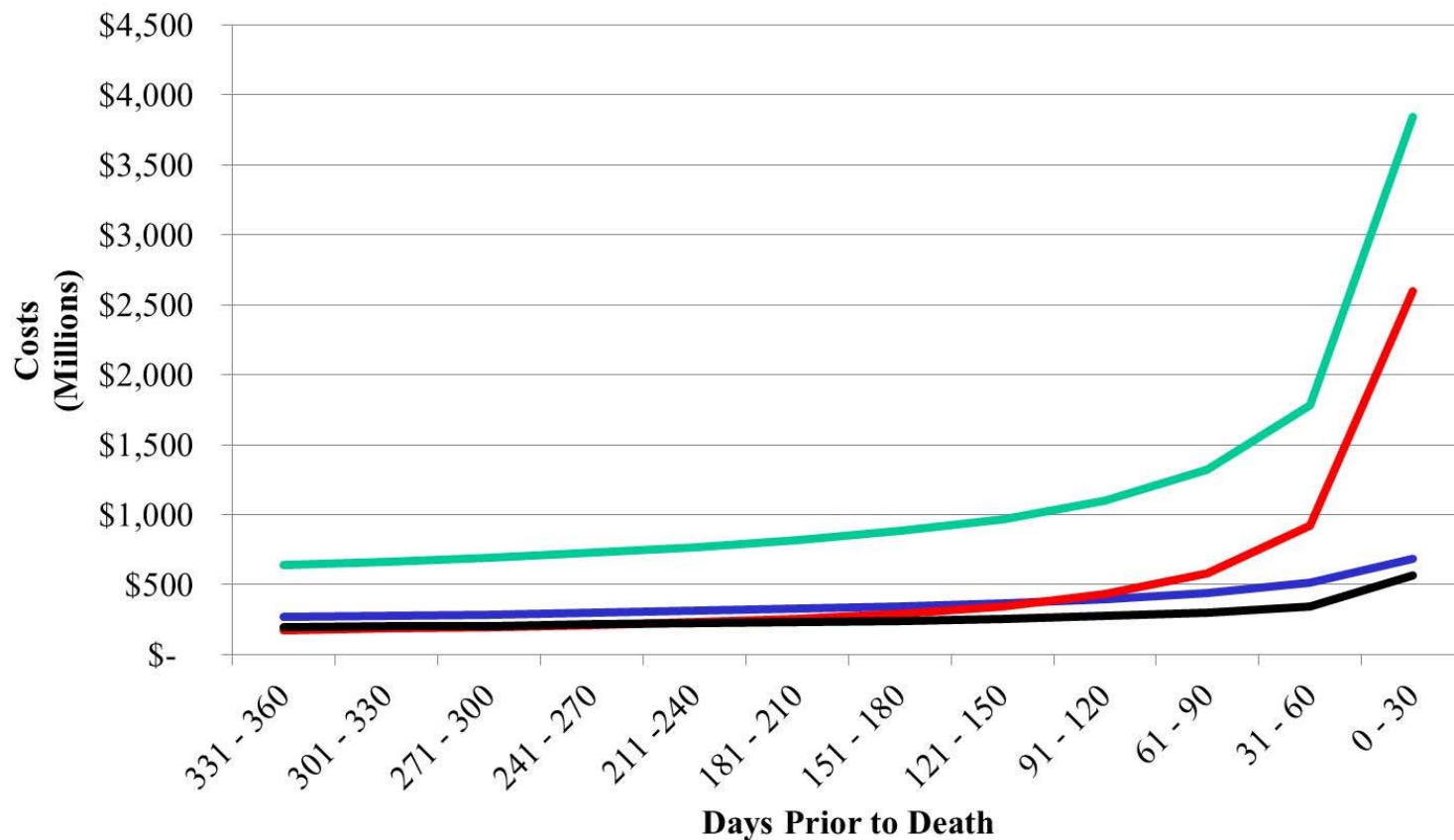
Health Care Cost in Last Year of Life, Ontario



* Cost is average total yearly cost for all Ontario decedents from FY 2010-2012

Results – Escalation of Cost

Q: When do costs escalate? Which sectors?



Results – Individual Predictors

Example: Chronic Diseases

- Order Average Cost for: Cancer, Congestive Heart Failure (CHF), Diabetes, Renal Disease, Osteoarthritis
- 5) Osteoarthritis - \$49,900
- 4) Cancer - \$54,500
- 3) Diabetes - \$57,900
- 2) CHF - \$ 59,200
- 1) Renal Disease - \$68,100

Results – Health System Predictors

- Example: Primary Care Enrollment
- Family Health Group: \$51,500
- Family Health Organization: \$48,900
- Family Health Teams: \$47,800
- Not rostered: \$51,200

Results – Summary

- More than 75% used: physician services, meds/devices, labs, and emergency rooms.
 - These services combined comprised less than 20% of total cost

Inpatient costs in last 4 months dominates

- Inpatient care: 75% of decedents, at an average cost of \$30,872.
- Inpt. care consumed 42.9% of all costs & rose sharply in the last 120 days prior to death.

Results - Summary

Institutionalized Care is expensive:

- 24% used long-term-care (LTC) and 60% used home care, at average costs of \$34,381 and \$7,347 (among users), respectively

Conclusions

- The cost of health care as death approaches is significant, but fairly stable with the exception of inpatient care in the last 120 days. Shifting the cost curve during this period will lead to substantial cost savings.
- The cost of LTC per patient is substantial when compared to average cost of home care.
- Introducing interventions that reduce hospitalizations and delay institutionalization will not only potentially improve the patient dying experience, but will also substantially reduce the costs associated with end-of-life care in Ontario.