

Supplementary Online Content

Wunsch H, Scales D, Gershengorn HB, et al. End-of-life care received by physicians compared with nonphysicians. *JAMA Netw Open*. 2019;2(7):e1967650. doi:10.1001/jamanetworkopen.2019.7650

eTable 1. Databases Used to Record Health Care Use and Costs at the End of Life

eTable 2. Details of Linkage Using a First-Pass Deterministic Approach (1), Followed by Probabilistic Approaches (2-8)

eTable 3. Characteristics of Matched Versus Unmatched Physicians

eTable 4. Intensity of Care Measures for Physicians Compared With Nonphysicians (Unmatched)

eTable 5. Intensity of Care Measures for Physicians Compared With Nonphysicians at the End of Life With a Diagnosis of Specific Chronic Comorbidities (Matched 1:3)

eTable 6. Intensity of Care Measures for Physicians Compared With Nonphysicians at the End of Life With Cancer (Matched 1:3)

eFigure. Location of Death for Physicians and Nonphysicians, by Age at Death

eReference

This supplementary material has been provided by the authors to give readers additional information about their work.

eTable 1. Databases Used to Record Health Care Use and Costs at the End of Life

Health care Sector	Database	Description
Continuing Care		
Long-term Care	Continuing Care Reporting System (CCRS)	Population-based resident information for over 600 publicly funded residential care homes with 24-hour nursing care
Complex Continuing Care	CCRS	Population-based information for all patients staying in a designated complex continuing care bed. These individuals are typically deemed to be in a nonacute state, but still in need for treatment (e.g., rehabilitation) in an institution
Home Care	Home Care Database (HCD) Resident Assessment Instrument-Home Care (RAI-HC)	Data from the Ontario Association of Community Care Access Centers, responsible for providing all publicly funded home care
Rehabilitation	National Rehabilitation Reporting System (NRS)	Data from participating adult inpatient rehabilitation facilities and programs across Ontario
Acute Care		
Inpatient without ICU	CIHI-DAD ^a	Administrative, clinical, and demographic data on all hospital discharges in Ontario
Inpatient with ICU	CIHI-DAD	Individuals with at least one Intensive Care Unit (ICU) visit in their last year of life
Same Day Surgery (SDS)	CIHI-DAD-SDS	Administrative, clinical and demographic data on same day surgeries performed in hospitals in Ontario
Emergency Department	National Ambulatory Care Reporting System (NACRS)	Captures all emergency department visits in Ontario
Outpatient Care		
Outpatient clinics	NACRS	Select outpatient visits held in hospitals, including dialysis clinics and cancer care clinics
Physician Billings	Ontario Health Insurance Plan (OHIP) Claims Database	Claims data for physicians in Ontario—includes claims in both inpatient and outpatient settings.
Nonphysician Billings	OHIP	Health professionals for provincially insured services, such as select midwives, oral surgeons, chiropractors, optometrists, and physiotherapists. Some care may occur for inpatients
Laboratory	OHIP	Outpatient laboratory services. Does not include laboratory services for inpatients
Drugs/Devices	Ontario Drug Benefit (ODB), Assistive Devices Program (ADP)	Drugs for those over 65 years, on social assistance, residents of LTC, home care recipients, Trillium drug program and special drugs program recipients for those qualifying for assistance. Select medically-necessary devices including home oxygen and respiratory devices.

^a CIHI-DAD: Canadian Institute for Health Information-Discharge Abstract Database: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4374686/pdf/pone.0121759.pdf>

eTable 2. Details of Linkage Using a First-Pass Deterministic Approach (1), Followed by Probabilistic Approaches (2-8)

Linkage Pass Number	Description of Linkage Variables	Matches, N (%)
Deterministic		
1.	Surname + Given Name 1 + Date of Birth + Sex	52,872 (86.7)
Probabilistic^a		
2.	Surname Initial + Given Name 1 Initials (1 st -3 Chars) + DOB	4,928 (8.1)
3.	DOB + Sex	2,421 (4.0)
4.	Surname Initial + Given Name 1 Initials (1 st -3 Chars) + Birth Year + Sex	306 (0.5)
5.	Given Name 1 Initials (1 st -3 Chars) + Birth Month + Birth Day + Sex	305 (0.5)
6.	NYSIIS (the phonetic code for surname) + Birth Year + Sex	28 (0.1)
7.	NYSIIS + Birth Year	114 (0.2)
8.	Death Date	43 (0.1)
Total No. of Matches		
		61,017
No. of CPSO Records		
		89,362
Match Rate		
		68.3%

DOB = date of birth; NYSIIS = New York State Identification and Intelligence System; CPSO = College of Physicians and Surgeons of Ontario

^a included manual review of each probable linkage

eTable 3. Characteristics of Matched Versus Unmatched Physicians

	Matched Physicians (n = 61,017)	Unmatched Physicians (n = 28,345)
Age, mean (SD)	70.1 (13.7)	67.3 (13.3)
Sex		
Male	38,422 (63.0)	5,844 (20.6)
Female	20,476 (33.6)	3,364 (11.9)
Unknown	2,119 (3.5)	19,137 (67.5)

eTable 4. Intensity of Care Measures for Physicians Compared With Nonphysicians (Unmatched)

	Physicians (n = 2,516)	Nonphysicians, (n = 954,836)	Absolute Difference (95% CI)	Adjusted Relative Risk ^a (95% CI)	P Value
Location of death, n (%)					
Home	1,079 (42.9)	385,270 (40.3)	2.5 (0.6, 4.5)	1.04 (1.00, 1.09)	0.05
Long-term care facility	213 (8.5)	77,015 (8.1)	0.4 (0.0, 1.5)	1.07 (0.94, 1.22)	0.29
Acute care hospital (non-ICU)	792 (31.5)	333,248 (34.9)	3.4 (1.6, 5.3)	0.93 (0.88, 0.98)	0.0099
Acute care hospital (ICU)	299 (11.9)	97,528 (10.2)	1.7 (0.5, 2.9)	1.21 (1.09, 1.35)	0.0003
Other	133 (5.3)	61,775 (6.5)	1.2 (0.2, 2.2)	0.78 (0.66, 0.92)	0.003
Last 6 months of life					
Any ED visits, n (%)	1,837 (73.0)	738,941 (77.4)	4.4 (2.7, 6.0)	0.96 (0.94, 0.98)	<.0001
Any hospitalization, n (%)	1,682 (66.9)	655,276 (68.6)	1.8 (0.0, 3.6)	1.00 (0.98, 1.02)	0.88
Any ICU admission, n (%)	523 (20.8)	185,195 (19.4)	1.4 (0.0, 2.9)	1.12 (1.04, 1.20)	0.003
Any mechanical ventilation, n (%)	345 (13.7)	132,674 (13.9)	0.2 (0.0, 1.5)	1.04 (0.95, 1.15)	0.40
Any dialysis, n (%)	101 (4.0)	33,843 (3.5)	0.5 (0.0, 1.2)	1.24 (1.02, 1.49)	0.03
Surgical feeding tube, n (%)	106 (4.2)	29,493 (3.1)	1.1 (0.5, 1.8)	1.36 (1.13, 1.64)	0.001
Tracheostomy, n (%)	30 (1.2)	10,903 (1.1)	0.1 (0.0, 0.5)	1.12 (0.78, 1.59)	0.55
CPR, n (%)	49 (2.9)	24,303 (3.7)	0.8 (0.0, 1.7)	0.79 (0.60, 1.04)	0.09
Any home care visits, n (%)	1,365 (54.3)	462,270 (48.4)	5.8 (3.9, 7.8)	1.16 (1.12, 1.20)	<.0001
Palliative care received, n (%)	1,330 (52.9)	441,746 (46.3)	6.6 (4.7, 8.6)	1.20 (1.16, 1.24)	<.0001
				Adjusted Regression Coefficient^a (95% CI)	
Number of ED visits, mean (SD)	1.5 (1.6)	1.8 (2.0)	0.3 (0.2, 0.4)	-0.21 (-0.26, - 0.15)	<.0001
Number of hospitalizations, mean (SD)	1.1 (1.2)	1.2 (1.2)	0.1 (0.0, 0.1)	0.01 (-0.03, 0.05)	0.63
Total days in the hospital, mean (SD)	13.4 (20.7)	14.0 (21.0)	0.6 (0.0, 1.4)	0.30 (-0.46, 1.06)	0.44
Number of ICU admissions, mean (SD)	0.3 (0.7)	0.3 (0.6)	0.0 (0.0, 0.1)	0.03 (0.00, 0.06)	0.02
Total days in an ICU, mean (SD)	1.9 (7.5)	1.7 (6.5)	0.2 (0.0, 0.5)	0.29 (0.00, 0.58)	0.05
Number of episodes of mechanical ventilation, mean (SD)	1.3 (7.4)	1.2 (6.2)	0.2 (0.0, 0.4)	0.21 (-0.07, 0.50)	0.14
Total number of physicians seen, mean (IQR)	12.8 (9.4)	11.9 (8.8)	0.9 (0.6, 1.3)	1.07 (0.76, 1.39)	<.0001
Home care visits, mean (SD)	38.3 (81.5)	29.2 (67.9)	9.2 (6.5, 11.8)	11.25 (8.07, 14.43)	<.0001

CI = confidence interval; ICU = intensive care unit; ED = emergency room; SD = standard deviation; IQR = interquartile range; CPR = cardiopulmonary resuscitation
^a adjusted for age, sex, income quintile, geographic region, Charlson comorbidity score (categorized as 0, 1-2, 3-4, and ≥ 5)

eTable 5. Intensity of Care Measures for Physicians Compared With Nonphysicians at the End of Life With a Diagnosis of Specific Chronic Comorbidities (Matched 1:3)^a

	Physicians (n = 1,375)	Nonphysicians (n = 4,117)	Absolute Difference (95% CI)	Adjusted Relative Risk ^b (95% CI)	P Value
Location of death, n (%)					
Home	484 (35.2)	1,264 (30.7)	4.5 (1.7, 7.3)	1.12 (1.04, 1.22)	0.0045
Long-term care facility	140 (10.2)	445 (10.8)	0.6 (0.0, 2.5)	0.96 (0.81, 1.15)	0.67
Acute care hospital (non-ICU)	545 (39.6)	1,802 (43.8)	4.1 (1.1, 7.2)	0.92 (0.85, 0.98)	0.02
Acute care hospital (ICU)	163 (11.9)	448 (10.9)	1.0 (0.0, 2.9)	1.08 (0.92, 1.28)	0.35
Other	43 (3.1)	158 (3.8)	0.7 (0.0, 1.9)	0.80 (0.58, 1.12)	0.20
Last 6 months of life					
Any ED visits, n (%)	1,119 (81.4)	3,516 (85.4)	4.0 (1.8, 6.2)	0.96 (0.93, 0.98)	0.0009
Any hospitalization, n (%)	1,121 (81.5)	3,421 (83.1)	1.6 (0.0, 3.9)	0.99 (0.97, 1.01)	0.41
Any ICU admission, n (%)	326 (23.7)	909 (22.1)	1.6 (0.0, 4.2)	1.08 (0.97, 1.20)	0.18
Any mechanical ventilation, n (%)	196 (14.3)	588 (14.3)	0.0 (0.0, 2.2)	0.99 (0.86, 1.15)	0.90
Any dialysis, n (%)	76 (5.5)	208 (5.1)	0.5 (0.0, 1.8)	1.14 (0.89, 1.45)	0.31
Surgical feeding tube, n (%)	65 (4.7)	124 (3.0)	1.7 (0.6, 2.8)	1.57 (1.17, 2.11)	0.003
Tracheostomy ^c , n (%)	17 (1.2)	45 (1.1)	0.1 (0.0, 0.8)	1.13 (0.65, 1.98)	0.67
CPR, n (%)	25 (2.2)	109 (3.2)	1.0 (0.0, 2.1)	0.68 (0.45, 1.05)	0.08
Any home care visits, n (%)	849 (61.7)	2,315 (56.2)	5.5 (2.5, 8.5)	1.11 (1.06, 1.17)	<.0001
Palliative care received, n (%)	868 (63.1)	2,284 (55.5)	7.7 (4.6, 10.7)	1.16 (1.11, 1.22)	<.0001
				Adjusted Regression Coefficient^b (95% CI)	
Number of ED visits, mean (SD)	1.8 (1.7)	2.0 (1.8)	0.2 (0.1, 0.3)	-0.18 (-0.28, -0.08)	0.0004
Number of hospitalizations, mean (SD)	1.4 (1.2)	1.4 (1.1)	0.0 (0.0, 0.1)	0.05 (-0.02, 0.11)	0.18
Total days in the hospital, mean (SD)	18.1 (22.7)	17.8 (22.6)	0.4 (0.0, 1.7)	0.71 (-0.63, 2.06)	0.30
Number of ICU admissions, mean (SD)	0.3 (0.8)	0.3 (0.7)	0.0 (0.0, 0.1)	0.04 (-0.01, 0.08)	0.12
Total days in an ICU, mean (SD)	2.4 (8.6)	1.9 (6.7)	0.5 (0.1, 1.0)	0.51 (0.02, 1.00)	0.04
Number of episodes of mechanical ventilation, mean (SD)	1.4 (7.6)	1.2 (6.9)	0.3 (0.0, 0.7)	0.24 (-0.21, 0.69)	0.29
Total number of physicians seen, mean (IQR)	15.2 (9.6)	14.3 (9.0)	0.8 (0.3, 1.4)	1.09 (0.58, 1.60)	<.0001
Home care visits, mean (SD)	43.5 (83.9)	32.4 (70.8)	11.1 (6.6, 15.7)	11.45 (6.61, 16.28)	<.0001

CI = confidence interval; ICU = intensive care unit; ED = emergency room; SD = standard deviation; IQR = interquartile range; CPR = cardiopulmonary resuscitation

^a Comorbidities include: cancer, congestive heart failure, chronic pulmonary disease, dementia, diabetes with end organ damage, peripheral vascular disease, chronic renal failure, severe chronic liver disease, or coronary artery disease as previously described [1].

^b Adjusted for Charlson comorbidity score (categorized as 0, 1-2, 3-4, and ≥ 5)

^cRegression model excluded Charlson comorbidity score due to sparse data.

eTable 6. Intensity of Care Measures for Physicians Compared With Nonphysicians at the End of Life With Cancer (Matched 1:3)

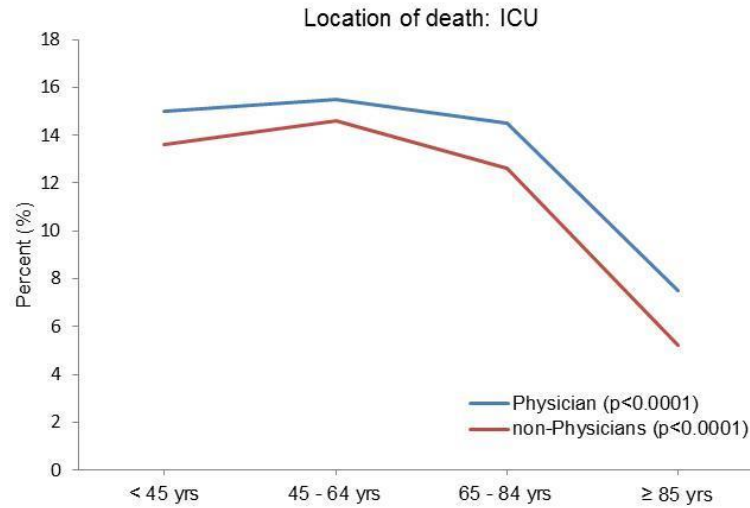
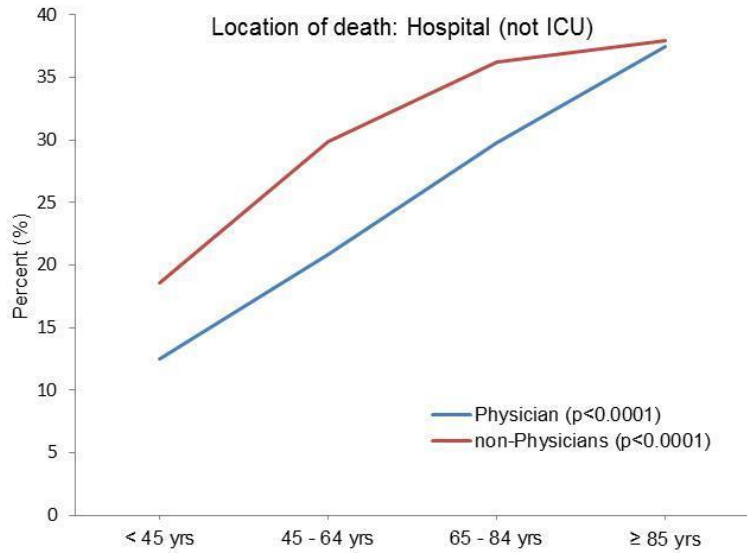
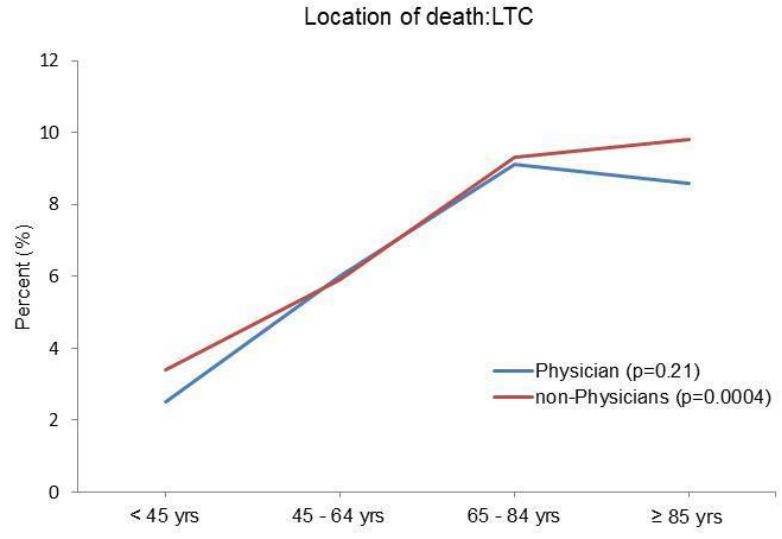
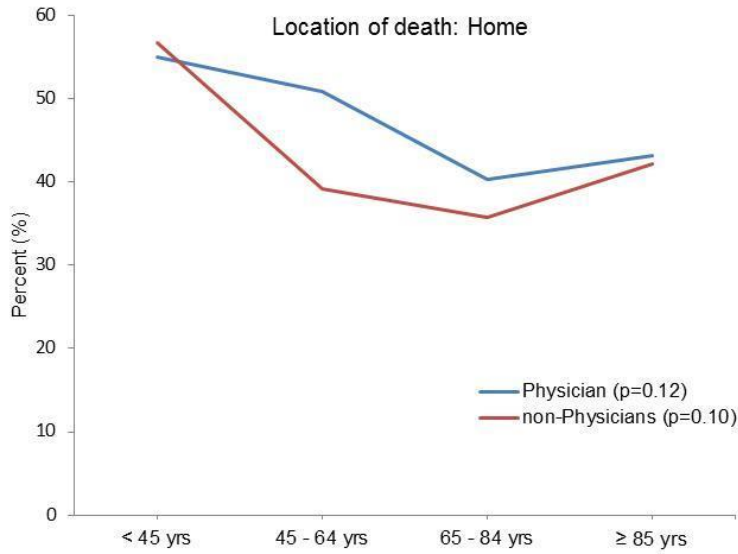
	Physicians (n = 457)	Nonphysicians (n = 1,347)	Absolute Difference (95% CI)	Adjusted Relative Risk ^a (95% CI)	P Value
Location of death, n (%)					
Home	172 (37.6)	385 (28.6)	9.1 (4.2, 13.9)	1.30 (1.13, 1.50)	0.0002
Long-term care facility	60 (13.1)	199 (14.8)	1.6 (0.0, 5.4)	0.89 (0.69, 1.16)	0.39
Acute care hospital (non-ICU)	184 (40.3)	652 (48.4)	8.1 (2.9, 13.4)	0.84 (0.74, 0.94)	0.004
Acute care hospital (ICU)	33 (7.2)	67 (5.0)	2.3 (0.0, 4.7)	1.46 (0.97, 2.19)	0.07
Other	8 (1.8)	44 (3.3)	1.5 (0.0, 3.3)	0.52 (0.25, 1.10)	0.09
Last 6 months of life					
Any ED visits, n (%)	373 (81.6)	1,193 (88.6)	7.0 (3.4, 10.5)	0.92 (0.88, 0.97)	0.0008
Any hospitalization, n (%)	406 (88.8)	1,229 (91.2)	2.4 (0.0, 5.5)	0.98 (0.94, 1.01)	0.20
Any ICU admission, n (%)	73 (16.0)	182 (13.5)	2.5 (0.0, 6.2)	1.19 (0.93, 1.51)	0.17
Any mechanical ventilation, n (%)	37 (8.1)	102 (7.6)	0.5 (0.0, 3.4)	1.07 (0.75, 1.53)	0.71
Any dialysis ^b , n (%)	11 (2.4)	20 (1.5)	0.9 (0.0, 2.3)	1.62 (0.80, 3.30)	0.18
Surgical feeding tube, n (%)	25 (5.5)	58 (4.3)	1.2 (0.0, 3.4)	1.27 (0.79, 2.02)	0.32
Tracheostomy ^c , n (%)					
CPR ^b , n (%)	6 (1.5)	15 (1.2)	0.3 (0.0, 1.5)	1.21 (0.47, 3.11)	0.69
Any home care visits, n (%)	334 (73.1)	935 (69.4)	3.7 (0.0, 8.5)	1.05 (0.99, 1.13)	0.12
Palliative care received, n (%)	408 (89.3)	1,175 (87.2)	2.1 (0.0, 5.5)	1.03 (0.99, 1.06)	0.19
Any chemotherapy, n (%)	173 (37.9)	402 (29.8)	8.0 (3.1, 12.9)	1.28 (1.13, 1.46)	<.0001
Any radiotherapy, n (%)	146 (31.9)	387 (28.7)	3.2 (0.0, 8.1)	1.12 (0.96, 1.30)	0.14
				Regression Coefficient^a (95% CI)	
Number of ED visits, mean (SD)	1.8 (1.7)	2.3 (1.9)	0.4 (0.2, 0.6)	-0.41 (-0.60, -0.23)	<.0001
Number of hospitalizations, mean (SD)	1.6 (1.2)	1.6 (1.1)	0.0 (0.0, 0.1)	0.02 (-0.10, 0.15)	0.73
Total days in the hospital, mean (SD)	18.8 (20.2)	18.3 (19.4)	0.5 (0.0, 2.6)	0.61 (-1.44, 2.66)	0.56
Number of ICU admissions, mean (SD)	0.2 (0.6)	0.2 (0.5)	0.0 (0.0, 0.1)	0.04 (-0.02, 0.10)	0.23
Total days in an ICU, mean (SD)	1.5 (6.3)	1.1 (5.6)	0.5 (0.0, 1.1)	0.47 (-0.18, 1.12)	0.16
Number of episodes of mechanical ventilation, mean (SD)	0.8 (4.4)	0.7 (6.5)	0.1 (0.0, 0.7)	0.09 (-0.44, 0.62)	0.74
Total number of physicians seen, mean (IQR)	16.4 (8.6)	16.0 (8.0)	0.5 (0.0, 1.4)	0.54 (-0.33, 1.42)	0.22
Home care visits, mean (SD)	39.7 (64.6)	38.3 (66.6)	1.4 (0.0, 8.4)	1.49 (-5.39, 8.36)	0.67

^a Adjusted for Charlson comorbidity score (categorized as 0, 1-2, 3-4, and ≥ 5)

^bRegression model excluded Charlson comorbidity score due to sparse data.

^c Suppression due to small cell size required as per ICES policy.

eFigure. Location of Death for Physicians and Nonphysicians, by Age at Death



eReference

<jrn>1. Iezzoni LI, Heeren T, Foley SM, Daley J, Hughes J, Coffman GA. Chronic conditions and risk of in-hospital death. *Health Serv Res.* 1994;29(4):435-460. [Medline:7928371](#)</jrn>