

## Supplementary Materials

### Supplementary Text

#### *Categorization of Patient Treatment Preferences*

Patients' preferences, as stated in clinical notes, were categorized according to predefined groups of initial treatment preferences. Patients could be assigned more than one preference, which included: 1) a willingness to be transferred to hospital for life prolonging treatment; 2) a focus on symptom management with a willingness to accept hospitalization; 3) a preference to avoid hospitalization and stay home as long as possible; 4) a preference to focus exclusively on comfort and stay at home; and 5) unknown preferences.

#### **Supplemental Table 1 - Description of datasets used in the study.**

Database	Description
Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)	Contains detailed diagnostic and procedural information for all hospital admissions in Canada.  DAD records have been demonstrated to have excellent agreement (over 99%) for demographic and administrative data. Regarding diagnoses, median agreement between original DAD records and re-abstracted records for the 50 most common most responsible diagnoses was noted to be 81% (Sensitivity 82%; Specificity 82%). The corresponding median agreement for the 50 most frequently performed surgical procedures was 92% (sensitivity 95%, positive predictive value 91%).(1)
Continuing Care Reporting System Long-Term Care (CCRS-LTC)	Contains demographic, administrative, clinical and resource utilization information on patients who receive continuing care services in hospitals or long-term care (LTC) homes in Canada. The long-term care dataset is generated from the Individual Assessment Instrument Minimum Data Set 2.0, a mandatory comprehensive, standardized and validated instrument for evaluating the needs, strengths, and preferences of elderly adults residing in nursing homes and receiving home care, contains detailed information on the functional status of these people.(2) Full assessments are completed on admission or referral, at quarterly intervals and following any significant health status change.

Home Care Database (HCD)	Contains patient-level data on government-funded home and community services. This dataset contains information on client, intake, assessment, admission, diagnostic and surgical procedure, and service delivery.
Immigration Refugees and Citizenship Canada's Permanent Resident Database (IRCC)	Contains immigration application records for people who initially applied to land in Ontario. Records date from 1985. The data contains permanent residents' demographic information such as country of citizenship, level of education, mother tongue, and landing date.
National Ambulatory Care Reporting System (NACRS)	Reports demographic, administrative, clinical and service-specific data for Emergency Department visits.
National Rehabilitation Reporting System (NRS)	Contains patient data collected from participating adult inpatient rehabilitation facilities and programs across Canada
Ontario Congestive Heart Failure (CHF)	Contains all Ontario individuals with CHF identified since 1991.  A diagnosis of HF was identified by the presence of one hospital record or physician claim, followed by a second record from either source within 1 year. This method has been previously validated with a sensitivity of 84.8% and a specificity of 97.0%.(3)
Ontario Drug Benefit (ODB)	Provides individual prescription records including all prescriptions dispensed to Ontario residents aged 65 years and older. Each medication claim has an associated prescriber identifier which indicates the health practitioner who wrote the prescription.  An audit of 5,155 randomly selected prescriptions dispensed from 50 Ontario pharmacies determined that the ODB had an error rate of 0.7% and none of the pharmacy characteristics examined (locations, owner affiliation, productivity) were associated with coding errors.(4)
Ontario Health Insurance Plan (OHIP)	Identifies physician billing claims and specialty on all services provided by fee-for-service physicians in Ontario.

Ontario Mental Health Reporting System (OMHRS)	Documents data on patients in adult designated inpatient mental health beds. This includes beds in General, Provincial Psychiatric, and Specialty Psychiatric facilities.
Office of the Registrar General – Deaths (ORGD)	An annual dataset containing information on all deaths registered in Ontario starting on January 1, 1990 that includes the cause of death as indicated on their death certificate.
Registered Persons Database (RPDB)	Registry of all Ontarians eligible to receive insured health services in the province and contains detailed demographic information as well as the Local Health Integration Networks (LHIN), which defines Ontario 14 regional areas within which people received most of their hospital care from local hospitals. The RPDB also provides information on the date and location of death for all individuals in Ontario.
Same Day Surgery (SDS)	Contains patient-level data for day surgery institutions in Ontario. Every record corresponds to one same-day surgery or procedure stay

**Supplementary Table 2 – Baseline characteristics at death of pre-matched adults receiving collaborative home-based palliative care and pre-matched controls who died with heart failure between 2013 and 2019 in the Toronto Central and Central local health integrated networks in Toronto, Ontario, Canada.**

	<b>Pre-matched Controls (n=21,643)</b>	<b>Pre-matched Collaborative palliative care (n=251)</b>	<b>Standardized difference</b>
<b>Age, years, mean (SD)</b>	84.47 ± 9.31	88.63 ± 7.90	0.48
<b>Female sex, n (%)</b>	11,489 (53.1%)	136 (54.2%)	0.02
<b>Living Arrangement, n (%)</b>			
<b>Alone</b>	2,224 (10.3%)	38 (15.1%)	0.15
<b>With Family</b>	6,140 (28.4%)	69 (27.5%)	0.02
<b>Other</b>	13,279 (61.4%)	144 (57.4%)	0.01

<b>Local Health Integrated Network</b>			
<b>Toronto Central</b>	8,531 (39.4%)	140 (55.8%)	0.33
<b>Central</b>	13,112 (60.6%)	111 (44.2%)	0.33
<b>Neighbourhood Income Quintile</b>			
<b>1</b>	5,123 (23.7%)	61 (24.3%)	0.01
<b>2</b>	4,602 (21.3%)	52 (20.7%)	0.01
<b>3</b>	3,746 (17.3%)	44 (17.5%)	0.01
<b>4</b>	3,946 (18.2%)	28 (11.2%)	0.2
<b>5</b>	4,226 (19.5%)	66 (26.3%)	0.16
<b>Recent Immigrant, n (%)</b>	2,194 (10.1%)	19 (7.6%)	0.09
<b>Duration of HF, years, median (IQR)</b>	4.6 (1.7-9.4)	5.4 (2.6-9.9)	0.15
<b>Chronic Conditions, n (%)</b>			
<b>Atrial Fibrillation/Flutter</b>	12,020 (55.5%)	175 (69.7%)	0.3
<b>Cancer</b>	13,717 (63.4%)	168 (66.9%)	0.07
<b>Chronic Kidney Disease</b>	11,480 (53.0%)	146 (58.2%)	0.1
<b>Chronic Obstructive Pulmonary Disease</b>	7,809 (36.1%)	74 (29.5%)	0.14
<b>Coronary Artery Disease</b>	14,641 (67.6%)	182 (72.5%)	0.11
<b>Dementia</b>	7,618 (35.2%)	67 (26.7%)	0.18
<b>Diabetes</b>	11,066 (51.1%)	104 (41.4%)	0.2

<b>Hypertension</b>	20,326 (93.9%)	239 (95.2%)	0.06
<b>Stroke</b>	5,307 (24.5%)	44 (17.5%)	0.17
<b>Implantable Cardioverter Defibrillator (ICD)<sup>a</sup>, n (%)</b>	489 (2.3%)	16 (6.4%)	0.2

<sup>a</sup>Inserted or performed within 10 years prior to death date

IQR – Interquartile range, SD – Standard deviation

**Supplementary Table 3 – Baseline characteristics at death of unmatched adults receiving collaborative home-based palliative care and unmatched controls who died with heart failure between 2013 and 2019 in the Toronto Central and Central local health integrated networks in Toronto, Ontario, Canada.**

	<b>Unmatched Controls (n=7,567)</b>	<b>Unmatched Collaborative palliative care (n=6)</b>	<b>Standardized difference</b>
<b>Age Category, years, n (%)</b>			
<80	1,725 (22.8%)	0 (0.0%)	0.8
80-90	*3688-3692	*1-5	0.4
>90	*2150-2154	*1-5	0.1
<b>Female sex, n (%)</b>	*3909-3913	*1-5	0.0
<b>Living Arrangement, n (%)</b>			
Alone	*1084-1088	*1-5	0.1
With Family	*2659-2663	*1-5	0.0
Other	*3815-3819	*1-5	0.0
<b>Local Health Integrated Network</b>			
Toronto Central	*2779-2783	*2-6	1.1
Central	*4783-4787	*1-5	1.1
<b>Recent Immigrant, n (%)</b>	6,621 (87.5%)	6 (100.0%)	0.5
<b>Duration of HF, years, median (IQR)</b>	1642 (620-3534)	6654 (3667-7602)	1.7
<b>Chronic Conditions, n (%)</b>			

<b>Atrial Fibrillation/Flutter</b>	3,943 (52.1%)	6 (100.0%)	1.4
<b>Cancer</b>	*4944-4948	*1-5	0.0
<b>Chronic Kidney Disease</b>	*4544-4548	*1-5	0.1
<b>Chronic Obstructive Pulmonary Disease</b>	*2678-2682	*1-5	0.4
<b>Coronary Artery Disease</b>	4,882 (64.5%)	6 (100.0%)	1.0
<b>Diabetes</b>	*4131-4135	*1-5	0.4
<b>Hypertension</b>	*7217-7221	*1-5	0.8
<b>Stroke</b>	1,930 (25.5%)	0 (0.0%)	0.8
<b>Implantable Cardioverter Defibrillator (ICD)<sup>a</sup>, n (%)</b>	*172-176	*2-6	2.9

<sup>a</sup>Inserted or performed within 10 years prior to death date

\*Small cells suppressed as per ICES policy

IQR – Interquartile range, SD – Standard deviation

**Supplementary Table 4 – Healthcare use and clinician visits among adults receiving collaborative home-based palliative care and matched controls who died with heart failure between 2013 and 2019 in the Toronto Central and Central local health integrated networks in Toronto, Ontario, Canada.**

	<b>Matched Controls (n=1,172)</b>	<b>Collaborative palliative care (n=245)</b>	<b>Rate Ratios (95% CI)</b>
<b>Days at Home, median (IQR)</b>	20 (9-29)	29 (13-30)	--
<b>Hospitalization, rate per 30 days (95% CI)</b>	0.22 (0.21-0.23)	0.14 (0.12-0.16)	0.6 (0.6-0.7)
<b>Emergency Department Use, rate per 30 days (95% CI)</b>	0.11 (0.11-0.12)	0.08 (0.06-0.09)	0.6 (0.6-0.8)
<b>ICU Admission, rate per 30 days (95% CI)</b>	0.04 (0.03-0.04)	0.02 (0.01-0.03)	0.6 (0.4-0.8)
<b>Time to first hospitalization, days, median (IQR)</b>	42 (11-121)	49 (14-142)	--
<b>Hospital Length of Stay, days, mean (SD)</b>	15 (24)	8 (16)	--
<b>Physician Home Palliative Visits, rate per 30 days (95% CI)</b>	0.20 (0.19-0.21)	1.28 (1.22-1.34)	6.3 (5.9–6.8)
<b>Nurse Practitioner Home Palliative Visits, rate per 30 days (95% CI)</b>	0.03 (0.03-0.04)	0.61 (0.56-0.65)	18.2 (15.7-21.0)
<b>General Practitioner Visits, rate per 30 days (95% CI)</b>	2.58 (2.54-2.61)	4.61 (4.50-4.72)	1.8 (1.7-1.8)
<b>Cardiologist Visits, rate per 30 days (95% CI)</b>	0.91 (0.89-0.94)	0.82 (0.76-0.87)	0.9 (0.8-1.0)

IQR – Interquartile range, SD – Standard deviation

## Supplementary References

1. Juurlink DN, Preyra C, Croxford R, Chong A, Austin PC, Laupacis A, et al. Canadian Institute for Health Information Discharge Abstract Database: a Validation Study. 2006.
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3. Schultz SE, Rothwell DM, Chen Z, Tu K. Identifying cases of congestive heart failure from administrative data: a validation study using primary care patient records. *Chronic diseases and injuries in Canada*. 2013 Jun;33(3):160–6.
4. Levy AR, O'Brien BJ, Sellors C, Grootendorst P, Willison D. Coding accuracy of administrative drug claims in the Ontario Drug Benefit database. *The Canadian journal of clinical pharmacology = Journal canadien de pharmacologie clinique*. 2003;10(2):67–71.