

Appendix VIII: Secondary analysis of patients who died from non-sudden death causes between July 1, 2015 and December 31, 2018

Table 1. Baseline characteristics of decedent cohort, comparing those who died of non-sudden death causes with a history of opioid use disorder (OUD) to those without OUD.

Characteristic	No. (%) of decedents															
	Total n= 323,727	No OUD n= 320,995 (99.1%)		No OUD (age-matched ^A) n= 10,913 (3.37%)		OUD n= 2,732 (0.84%)		Total OUD ^C n= 2,732 (0.84%)		Hospitalizations or emergency department visits n=1,214 (0.38%)		OAT ^D only n=1,099 (0.34%)		Hospitalizations or emergency department visits and OAT n= 419 (0.13%)		Std. Diff. ^B
Sex																
Female	162,528	161,376	(50.3%)	4,695	(43.0%)	1,152	(42.2%)	606	(49.9%)	368	(33.5%)	178	(42.5%)	0.02		
Male	161,199	159,619	(49.7%)	6,218	(57.0%)	1,580	(57.8%)	608	(50.1%)	731	(66.5%)	241	(57.5%)	0.02		
Age, yr																
18-44	6,337	5,804	(1.8%)	2,099	(19.2%)	533	(19.5%)	122	(10.0%)	*246-250		*161-165		0.01		
45-54	13,080	12,518	(3.9%)	2,180	(20.0%)	562	(20.6%)	161	(13.3%)	305	(27.8%)	96	(22.9%)	0.02		
55-64	34,820	34,051	(10.6%)	3,100	(28.4%)	769	(28.1%)	291	(24.0%)	369	(33.6%)	109	(26.0%)	0.01		
65-74	58,867	58,466	(18.2%)	1,665	(15.3%)	401	(14.7%)	234	(19.3%)	125	(11.4%)	42	(10.0%)	0.02		
75-84	86,097	85,811	(26.7%)	1,125	(10.3%)	286	(10.5%)	236	(19.4%)	44	(4.0%)	6	(1.4%)	0.01		
85+	124,526	124,345	(38.7%)	744	(6.8%)	181	(6.6%)	170	(14.0%)	*6-10		*1-5		0.01		
Age, mean (SD)	78.01	78.18	(13.53)	58.36	(16.43)	58.07	(16.47)	65.83	(16.50)	53.41	(13.02)	47.82	(14.14)	0.01		
Income Quintile																
Quintile 1 (Q1)	73,445	72,434	(22.6%)	2,617	(24.0%)	1,011	(37.0%)	372	(30.6%)	476	(43.3%)	163	(38.9%)	0.29		
Q2	62,309	61,800	(19.2%)	2,023	(18.5%)	509	(18.6%)	226	(18.6%)	197	(17.9%)	86	(20.5%)	0		
Q3	52,627	52,269	(16.3%)	1,795	(16.4%)	358	(13.1%)	158	(13.0%)	137	(12.5%)	63	(15.0%)	0.09		
Q4	46,375	46,126	(14.4%)	1,512	(13.9%)	249	(9.1%)	123	(10.1%)	99	(9.0%)	27	(6.4%)	0.15		
Q5 (Highest)	43,612	43,395	(13.5%)	1,422	(13.0%)	217	(7.9%)	119	(9.8%)	*72-76	(7.7%)	*22-26		0.17		
Rurality																
Rural	43,975	43,605	(13.6%)	1,502	(13.8%)	370	(13.5%)	210	(17.3%)	113	(10.3%)	47	(11.2%)	0.01		
Urban ^E	278,368	276,024	(86%)	9,369	(85.8%)	2,344	(85.8%)	998	(82.2%)							
Missing Data	1,384	1,366	(0.4%)	42	(0.4%)	18	(0.7%)	6	(0.5%)	*1-5		*7-11		0.04		
Age and Labour Force Quintile																
Missing Data	3,921	3,839	(1.2%)	174	(1.6%)	82	(3.0%)	33	(2.7%)	27	(2.5%)	22	(5.3%)	0.09		
Quintile 1 (Q1)	38,644	38,268	(11.9%)	1,950	(17.9%)	376	(13.8%)	141	(11.6%)	179	(16.3%)	56	(13.4%)	0.11		
Q2	47,776	47,247	(14.7%)	1,986	(18.2%)	529	(19.1%)	200	(16.5%)	248	(22.6%)	81	(29.3%)	0.03		
Q3	51,678	51,229	(16.0%)	1,947	(17.8%)	449	(16.4%)	189	(15.6%)	173	(15.7%)	87	(20.8%)	0.04		
Q4	61,440	60,966	(19.0%)	2,001	(18.3%)	474	(17.3%)	213	(17.5%)	195	(17.7%)	66	(15.8%)	0.03		
Q5 (Highest)	120,268	119,446	(37.2%)	2,855	(26.2%)	82	(30.1%)	438	(36.1%)	277	(25.2%)	107	(25.5%)	0.09		
Material Resources Quintile																
Missing Data	3,921	3,839	(1.2%)	174	(1.6%)	82	(3.0%)	33	(2.7%)	27	(2.5%)	22	(5.3%)	0.09		
Quintile 1 (Q1)	57,431	57,150	(17.8%)	1,771	(16.2%)	281	(10.3%)	154	(12.7%)	97	(8.8%)	30	(7.2%)	0.18		
Q2	60,267	59,900	(18.7%)	1,814	(16.6%)	367	(13.4%)	189	(15.6%)	127	(11.6%)	51	(12.2%)	0.09		

Appendix 8, as submitted by the authors. Appendix to: Lau J, Scott MM, Everett K, et al. Association between opioid use disorder and palliative care: a cohort study using linked health administrative data in Ontario, Canada. *CMAJ* 2024. doi: 10.1503/cmaj.231419. Copyright © 2024 The Author(s) or their employer(s). To receive this resource in an accessible format, please contact us at cmajgroup@cmaj.ca.

Q3	62,173	61,793	(19.3%)	2,109	(19.3%)	380	(13.9%)	186	(15.3%)	140	(12.7%)	54	(12.9%)	0.15
Q4	66,173	65,652	(20.5%)	2,269	(20.8%)	521	(19.1%)	230	(18.9%)	209	(19.0%)	82	(19.6%)	0.04
Q5 (Highest)	73,762	72,661	(22.6%)	2,776	(25.4%)	1,101	(40.3%)	422	(34.8%)	499	(45.4%)	180	(43.0%)	0.32
Racialized and Newcomer Populations Quintile														
Missing Data	3,921	3,839	(1.2%)	174	(1.6%)	82	(3.0%)	33	(2.7%)	27	(2.5%)	22	(5.3%)	0.09
Quintile 1 (Q1)	75,682	75,128	(23.4%)	2,276	(20.9%)	554	(20.3%)	285	(23.5%)	187	(17.0%)	82	(19.6%)	0.01
Q2	70,590	69,927	(21.8%)	2,204	(20.2%)	663	(24.3%)	320	(26.4%)	233	(21.2%)	110	(26.3%)	0.10
Q3	60,149	59,600	(18.6%)	2,054	(18.8%)	549	(20.1%)	232	(19.1%)	245	(22.3%)	72	(17.2%)	0.03
Q4	56,598	56,100	(17.5%)	1,976	(18.1%)	498	(18.2%)	189	(15.6%)	231	(21.0%)	78	(18.6%)	0
Q5 (Highest)	56,787	56,401	(17.6%)	2,229	(20.4%)	386	(14.1%)	155	(12.8%)	176	(16.0%)	55	(13.1%)	0.17
Household Dwellings Quintile														
Missing Data	3,921	3,839	(1.2%)	174	(1.6%)	82	(3.0%)	33	(2.7%)	27	(2.5%)	22	(5.3%)	0.09
Quintile 1 (Q1)	37,105	36,918	(11.5%)	1,497	(13.7%)	187	(6.8%)	90	(7.4%)	76	(6.9%)	21	(5.0%)	0.23
Q2	50,270	49,976	(15.6%)	1,741	(16.0%)	294	(10.8%)	151	(12.4%)	110	(10.0%)	33	(7.9%)	0.15
Q3	60,271	59,862	(18.6%)	1,998	(18.3%)	409	(15.0%)	206	(17.0%)	150	(13.6%)	53	(12.6%)	0.09
Q4	72,887	72,296	(22.5%)	2,360	(21.6%)	591	(21.6%)	283	(23.3%)	235	(21.4%)	73	(17.4%)	0
Q5	99,273	98,104	(30.6%)	3,143	(28.8%)	1,169	(42.8%)	451	(37.1%)	501	(45.6%)	217	(51.8%)	0.30
Immigrant Status	21,006	20,931	(6.5%)	1,127	(10.3%)	75	(2.7%)	33	(2.7%)	36	(3.3%)	6	(1.4%)	0.31

- A: Decedents with OUD (cases) were matched to decedents without OUD group (controls) on age \pm 2 years
B: Standardized difference compares all patients with OUD (Total OUD) with age-matched decedents without OUD
C: Total OUD cases remained unchanged after matching to No OUD group (controls) on age \pm 2 years
D: OAT – Opioid Agonist Treatment
E: Blank cells a result of missing data

Table 2. Characteristics of decedent cohort related to comorbidities and chronic conditions, comparing those who died of non-sudden death causes with a history of opioid use disorder (OUD) to those without OUD .

Characteristic	No. (%) of decedents												Std. Diff. ^B	
	Total n= 323,727	No OUD n= 320,995 (99.1%)		No OUD (age- matched ^A) n= 10,913 (3.37%)		OUD n= 2,732 (0.84%)								
						Total OUD ^C n= 2,732 (0.84%)	Hospitalizations or emergency department visits n=1,214 (0.38%)	OAT ^D only n=1,099 (0.34%)	Hospitalizations or emergency department visits and OAT n= 419 (0.13%)					
Number of Active Comorbidities														
0	21,024	20,834	(6.5%)	1,407	(12.9%)	190	(7.0%)	19	(1.6%)	151	(13.7%)	20	(4.8%)	0.2
1	51,215	50,855	(15.8%)	2,352	(21.6%)	360	(13.2%)	72	(5.9%)	230	(20.9%)	58	(13.8%)	0.22
2	64,580	64,132	(20.0%)	2,414	(22.1%)	448	(16.4%)	143	(11.8%)	224	(20.4%)	81	(19.3%)	0.15
3	60,448	60,016	(18.7%)	1,875	(17.2%)	432	(15.8%)	186	(15.3%)	161	(14.6%)	85	(20.3%)	0.04
4	48,480	48,049	(15.0%)	1,244	(11.4%)	431	(15.8%)	221	(18.2%)	141	(12.8%)	69	(16.5%)	0.13
5	34,241	33,936	(10.6%)	752	(6.9%)	305	(11.2%)	187	(15.4%)	75	(6.8%)	43	(10.3%)	0.15
6	21,644	21,404	(6.7%)	432	(4.0%)	240	(8.8%)	150	(12.4%)	59	(5.4%)	31	(7.4%)	0.2
7+	22,095	21,769	(6.8%)	437	(4.0%)	326	(11.9%)	236	(19.4%)	58	(5.3%)	32	(7.6%)	0.3
Charlson Score														
0	29,927	29,565	(9.2%)	949	(8.7%)	362	(13.3%)	148	(12.2%)	130	(11.8%)	84	(20.0%)	0.15
1	37,089	36,733	(11.4%)	778	(7.1%)	356	(13.0%)	151	(12.4%)	130	(11.8%)	75	(17.9%)	0.2
2+	129,411	127,939	(39.9%)	4,532	(41.5%)	1,472	(53.9%)	857	(70.6%)	389	(35.4%)	226	(53.9%)	0.25
Mean (SD)	2.87	2.87	(2.36)	3.33	(2.54)	3.06	(2.57)	3.40	(2.58)	2.71	(2.46)	2.66	(2.58)	0.1
Median (Q1-Q3)	2	2	(1-4)	3	(1-6)	2	(1-5)	3	(1-5)	2	(1-4)	2	(1-4)	0.12
Chronic Conditions														
Coronary Artery Disease	56,205	55,834	(17.4%)	1,188	(10.9%)	371	(13.6%)	246	(20.3)	93	(8.5%)	32	(7.6%)	0.08
Cancer	137,284	136,379	(42.5%)	4,823	(44.2%)	905	(33.1%)	499	(41.1%)	313	(28.5%)	93	(22.2%)	0.23
Chronic Heart Failure	72,175	71,652	(22.3%)	1,316	(12.1%)	523	(19.1%)	348	(28.7%)	112	(10.2%)	63	(15.0%)	0.2
Chronic Obstructive Pulmonary Disease	54,731	53,959	(16.8%)	1,275	(11.7%)	772	(28.3%)	430	(35.4%)	242	(22.0%)	100	(23.9%)	0.42
Dementia	47,024	46,959	(14.6%)	413	(3.8%)	75	(2.7%)	70	(5.8%)	*1-5		*1-5		0.06
Diabetes	103,137	102,283	(31.9%)	2,986	(27.4%)	854	(31.3%)	502	(41.4%)	240	(21.8%)	112	(26.7)	0.09
Hepatitis C ^E	2,452	1,968	(0.6%)	150	(1.4%)	484	(17.7%)	118	(9.7%)	206	(18.7%)	160	(38.2%)	0.58
Human Immunodeficiency Viruses ^F	632	575	(0.2%)	74	(0.7%)	57	(2.1%)	16	(1.3%)	22	(2.0%)	19	(4.5%)	0.12
Infective Endocarditis	837	707	(0.2%)	30	(0.3%)	130	(4.8%)	40	(3.3%)	24	(2.2%)	66	(15.8%)	0.29
Mental Health	41,850	40,773	(12.7%)	1,623	(14.9%)	1,077	(39.4%)	532	(43.8%)	323	(29.4%)	222	(53.0%)	0.57
Mood Disorder	77,741	76,317	(23.8%)	3,199	(29.3%)	1,424	(52.1%)	647	(53.3%)	516	(47.0%)	261	(62.3%)	0.48
Renal Disease	60,101	59,452	(18.5%)	1,574	(14.4%)	649	(23.8%)	403	(33.2%)	139	(12.6%)	107	(25.5%)	0.24

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Stroke	20,679	20,580	(6.4%)	427	(3.9%)	99	(3.6%)	66	(5.4%)	25	(2.3%)	8	(1.9%)	0.02
Other Harmful Substance Use														
Benzodiazepine	17	190	(0.1%)	19	(0.2%)	27	(1.0%)	12	(1.0%)	9	(0.8%)	6	(1.4%)	0.11
Stimulant	265	146	(0.0%)	21	(0.2%)	119	(4.4%)	43	(3.5%)	22	(2.0%)	54	(12.9%)	0.28
Alcohol	11,702	11,204	(3.5%)	661	(6.1%)	498	(18.2%)	243	(20%)	134	(12.2%)	121	(28.9%)	0.38

A: Decedents with OUD (cases) were matched to decedents without OUD (controls) on age \pm 2 years

B: Standardized difference compares all decedents with OUD (“Total OUD”) with age-matched decedents without OUD (“No OUD (age-matched^A)”)

C: Number of OUD cases remained unchanged after matching to controls on age \pm 2 years

D: OAT – Opioid Agonist Treatment

E: Lookback period of 5 years before death

F: Lookback for any HIV diagnosis from birth to death

Table 3. Palliative care received overall, stratified by setting, and the intensity of palliative care received in the last 3 months of life for patients who died of non-sudden death causes^A

Variable	Total n= 323,727	No OUD n=320,995 (99.1%)	No OUD (age- matched ^B) n=10,913 (3.37%)	OU ^C n=2,732 (0.84%)	Unadjusted Relative Risk for all patients (95% CI)		Adjusted Relative Risk for all patients (95% CI)					
No. (%) of decedents												
Any palliative care received	238,956	(73.8%)	237,024	(73.8%)	7,691	(70.5%)	1,932	(70.7%)	1.00	(0.98; 1.03)	0.99	(0.96; 1.01)
Palliative care setting												
Homes									0.73	(0.68; 0.78)	0.75	(0.70; 0.81)
Home Care ^D	78,157	(24.1%)	77,615	(24.2%)	688	(6.3%)	542	(19.8%)				
Home MD visits	67,353	(20.8%)	66,925	(20.8%)	3,229	(29.6%)	428	(15.7%)				
Clinics	89,858	(27.8%)	89,155	(27.8%)	3,606	(33.0%)	703	(25.7%)	0.78	(0.73; 0.83)	0.79	(0.74; 0.85)
Acute care hospitals	164,201	(50.7%)	162,595	(50.7%)	5,987	(54.9%)	1,606	(58.8%)	1.07	(1.03; 1.11)	1.03	(1.00; 1.07)
Long term care institutes	46,305	(14.3%)	46,132	(14.4%)	688	(6.3%)	173	(6.3%)	1.00	(0.86; 1.18)	0.98	(0.83; 1.15)
Mean (SD)												
Intensity of palliative care (days)	14.33	(20.06)	14.31	(20.05)	17.67	(21.20)	16.13	(22.27)	1.09	(1.03;1.15)	0.91	(0.86;0.96)

A: Covariates in modified Poisson regression models: year at index, age, sex, rurality, income quintile, dependency quintile, immigrant status, Charlson comorbidity index, asthma, HIV, hepatitis C, infective endocarditis, cancer, congestive heart failure, chronic obstructive pulmonary disease, renal disease, osteoarthritis, and history of drug toxicity (stimulants, benzodiazepines, alcohol).

B: Decedents with OUD (cases) were matched to decedents without OUD group (controls) on age \pm 2 years

C: Number of OUD cases remained unchanged after matching to controls on age \pm 2 years

D: Palliative home care is public funded home-based palliative care services including case coordinator, nurse, personal support worker, occupational therapy, physiotherapy and equipment. It does not include physician visits.

Table 4. Timing of palliative care among all decedents who died of non-sudden death causes and received palliative care within 365 days of death

Characteristic	No. (%) of decedents														
	Total n= 255,233	No OUD n= 253,063 (99.1%)		No OUD (age matched ^A) n= 8,145 (3.19%)		OUD n= 2,170 (0.85%)		Total OUD ^C n= 2,170 (0.85%)		Hospitalizations or emergency department visits n=1,214 (0.38%)		OAT ^D only n=1,099 (0.34%)		Hospitalizations or emergency department visits and OAT n= 419 (0.13%)	
Initiation of PC ^E was within last 90 days before death	125,800	125,075	(49.4%)	3,777	(46.4%)	725	(33.4%)	240	(23.0%)	386	(49.4%)	99	(28.9%)	027	
Setting for PC if initiated within last 90 days before death															
Acute care	78,068	77,455	(61.9%)	2,708	(71.7%)	619	(84.6%)	181	(75.4%)	334-338 ^E	(63.1%)	94-98 ^E	(80.7%)	0.34	
Clinic	11,529	11,488	(9.2%)	371	(9.8%)	41	(5.7%)	16	(6.7%)	20-24 ^E	(22.2%)	1-5 ^E	(9.8%)	0.19	
Home	19,248	19,193	(15.3%)	553	(14.6%)	55	(7.6%)	29	(12.1%)	21-25 ^E	(22.2%)	1-5 ^E	(9.8%)	0.23	
Long term care	16,955	16,939	(13.5%)	145	(3.8%)	16	(2.2%)	11-15 ^E	(4.0%)	1-5 ^E	(22.2%)	1-5 ^E	(9.8%)	0.1	
Setting for PC if initiated before the last 90 days (91-365 days before death)															
Acute care	61,554	60,592	(47.3%)	2,214	(50.7%)	962	(66.6%)	515	(64.0%)	250	(63.1%)	197	(80.7%)	0.34	
Clinic	14,402	14,247	(11.1%)	761	(17.4%)	155	(10.7%)	81	(10.1%)	52-56 ^F	(22.2%)	18-22 ^E	(9.8%)	0.21	
Home	41,001	40,712	(31.8%)	1,229	(28.1%)	289	(20.0%)	177	(22.0%)	88	(22.2%)	24	(9.8%)	0.19	
Long term care	12,476	12,437	(9.7%)	164	(3.8%)	39	(2.7%)	32	(4.0%)	2-6 ^E	(22.2%)	1-5 ^E	(9.8%)	0.06	
Time of initiation before death (days)	Mean (SD ^G)														
Overall	134.99	134.62	(125.45)	142.26	(124.93)	178.04	(129.59)	203.55	(122.94)	139.01	(130.47)	189.33	(126.09)	0.28	
Acute care	189.42	189.09	(128.40)	191.74	(128.97)	246.90	(120.96)	252.53	(118.82)	235.27	(128.55)	250.31	(105.70)	0.44	
Clinic	114.09	113.60	(115.29)	116.96	(116.35)	156.76	(125.15)	185.23	(119.04)	112.92	(119.76)	177.02	(125.56)	0.33	
Home	144.95	144.37	(123.07)	175.38	(120.41)	228.64	(120.51)	232.47	(118.35)	190.36	(130.61)	277.43	(91.55)	0.44	
Long term care	113.93	113.76	(132.60)	138.63	(136.05)	203.38	(138.63)	200.50	(140.03)	228.57	(118.13)			0.47	

A: Decedents with OUD (cases) were matched to patients without OUD group (controls) on age ± 2 years

B: Standardized difference compares all decedents with OUD (“Total OUD”) with age-matched decedents without OUD (“No OUD (age-matched^A)”)

C: Number of OUD cases remained unchanged after matching to No OUD group (controls) on age ± 2 years

D: OAT – Opioid Agonist Treatment

E: PC – Palliative Care

F: Ranges presented to prevent back-calculation of small cell counts (<=5)

G: Standard Deviation

Table 5: Top 10 causes of death for decedents with and without opioid use disorder (OUD) after excluding sudden causes

No OUD (n=320,995)	%	OUD (n=2,732)	%
Neoplasms	29.4	Diseases of the Circulatory System	22.5
Diseases of the Circulatory System	27.1	Neoplasms	21.9
Diseases of the Respiratory System	11.5	Mental Disorders	13.2
Mental Disorders	9.2	Diseases of the Respiratory System	12.9
Diseases of the Digestive System	4.3	Diseases of the Digestive System	7.7
Diseases of the Nervous System and Sense Organs	4.2	Infectious and Parasitic Diseases	6.3
Diseases of the Genitourinary System	3.7	Endocrine, Nutritional, and Metabolic Diseases and Immunity Disorders	5.0
Endocrine, Nutritional, and Metabolic Diseases and Immunity Disorders	3.2	Symptoms, Signs, and Ill-Defined Conditions	3.7
Symptoms, Signs, and Ill-Defined Conditions	3.0	Diseases of the Genitourinary System	3.7
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