SUPPLEMENTAL APPENDIX

Comparison of Care Patterns and Rehospitalizations for Mechanically Ventilated Patients in New York and Ontario
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Table E1. Definitions of US International Classification of Disease (ICD-9-CM) and Canadian Classification of Health Interventions (CCI) codes for mechanical ventilation

ICD-9-CM codes	
96.70	Continuous invasive mechanical ventilation of unspecified duration
96.71	Continuous invasive mechanical ventilation for less than 96 consecutive hours
96.72	Continuous invasive mechanical ventilation for 96 consecutive hours or more
CCI codes	
1.GZ.31	Ventilation, respiratory system
.CA-ND	Invasive per orifice approach by endotracheal intubation. Includes: Controlled/assisted mechanical ventilation (CMV, AMV, IPPV); High frequency ventilation (HFV); Intermittent mandatory ventilation (IMV, SIMV); Inverse ratio ventilation (IRV); Pressure support/ control ventilation (PSV, PCV)
.CA-EP	Invasive per orifice approach by endotracheal intubation. Includes bag-valve connected to endotracheal tube for ventilation
.CR-ND	Invasive per orifice with incision approach for intubation through tracheostomy. Includes: Controlled/assisted mechanical ventilation (CMV, AMV, IPPV); High frequency ventilation (HFV); Intermittent mandatory ventilation (IMV, SIMV); Inverse ratio ventilation (IRV); Pressure support/ control ventilation (PSV, PCV)
.GP-ND	Invasive percutaneous transluminal approach (e.g. transtracheal jet) through needle. Includes: High frequency ventilation [HFV] via transtracheal jet

Table E2. Prevalence of Charlson-Deyo Comorbidities Among Mechanically Ventilated Patients Rehospitalized within 30 days in New York and Ontario

	New York – 30 day rehospitalizations		Ontario – 30 day rehospitalizations	
Individual Comorbidity, %	**None (n=55,536)**	**One or More (n=15,527)**	**None (n=36,295)**	**One or More (n=5,580)**
Cerebrovascular Disease	8.4	8.4	9.7	10.1
Chronic Obstructive Pulmonary Disease	27.6	30.4	15.3	20.9
Congestive Heart Failure	22.4	30.6	15.5	24.0
Connective tissue / rheumatic disease	1.8	1.9	1.5	2.5
Dementia	0.9	1.3	2.6	3.3
Diabetes with complications	2.8	4.4	21.5	28.0
Diabetes without complications	20.4	23.1	6.9	7.4
Hemiplegia or Paraplegia	3.4	3.2	3.4	3.3
HIV/AIDS	-	-	-	-
Liver Disease, any	2.4	3.0	2.2	2.5
Liver Disease, moderate or severe	1.8	2.4	2.2	4.2
Metastatic Cancer	3.3	4.8	3.7	6.1
Myocardial Infarction	8.2	9.2	18.1	21.9
Peptic Ulcer Disease	2.2	2.5	4.1	5.3
Peripheral Vascular Disease	4.4	5.6	8.6	10.7
Primary Cancer	8.2	11.7	9.6	13.4
Renal Disease	13.2	21.1	6.3	11.7

Table E3. Data on rehospitalizations stratified by Insurance status and Race (NY data only)

	No rehospitalization (n=55,536)	One or more rehospitalizations (n=15,527)
Insurance, %		
Medicare	73.4	26.7
Medicaid	80.2	19.8
Private	82.2	17.8
Self-Pay	86.8	13.2
Other*	87.6	12.4
Race†, %		
White	78.6	21.4
Black	77.2	22.8
Hispanic	77.9	22.1
Asian	75.5	24.5
Other	77.9	22.1

*Other insurance category includes CHAMPUS (Civilian Health and Medical Program of the Uniformed Services), the Veterans' Affairs Plan, other federal and non-federal insurance programs, workers' compensation and automobile medical claims.
†Other race category includes Native American (0.3%), Native Hawaiian or Pacific Islander (0.1%) and unknown/declined (15.6%).

Table E4. Factors Associated with Increased Risk for 30 day Rehospitalization for Mechanically Ventilated patients in New York and Ontario*

	New York – 30-day rehospitalizations			Ontario – 30-day rehospitalizations		
	n (%) (71,063)	Hazard Ratio (95% CI)	P value	n (%) (n=41,875)	Hazard Ratio (95% CI)	P value
Age						
18-64	36,835 (51.8)	ref	-	22,081 (52.6)	Ref	
65-74	14,122 (19.9)	1.21 (1.16 – 1.27)	<0.001	9,959 (23.7)	1.03 (0.96 – 1.10)	0.40
75-84	13,234 (18.6)	1.31 (1.26 – 1.37)	<0.001	7,933 (18.9)	1.11 (1.04 – 1.20)	0.003
≥ 85	6,872 (9.7)	1.26 (1.19 – 1.33)	<0.001	2,003 (4.8)	1.08 (0.96 – 1.22)	0.19
Sex						
Female	32,692 (46.0)	ref		16,391 (39.1)	Ref	
Male	38,369 (54.0)	NA‡	0.002	25,484 (60.9)	0.90 (0.85 – 0.95)	<0.001
Household income (quintiles)†						
1 (lowest)	21,790 (30.7)	ref	-	9,832 (23.5)	Ref	
2	8,884 (12.5)	0.98 (0.93 – 1.04)	0.52	8,960 (21.4)	0.94 (0.87 – 1.02)	0.13
3	9,089 (12.8)	0.96 (0.91 – 1.01)	0.15	8,071 (19.3)	0.86 (0.79 – 0.93)	<0.001
4	13,889 (19.5)	1.00 (0.95 – 1.04)	0.84	7,706 (18.4)	0.98 (0.91 – 1.07)	0.70
5 (highest)	17,411 (24.5)	0.98 (0.93 – 1.02)	0.24	7,039 (16.8)	NA‡	
Mechanical ventilation						
<96 hours without tracheostomy	41,517 (58.5)	ref		29,977 (71.6)	Ref	
≥96 hours without tracheostomy	19,255 (27.1)	0.97 (0.93 – 1.01)	0.12	8,000 (19.1)	0.93 (0.87 – 1.00)	0.06
With tracheostomy	10,231 (14.4)	1.17 (1.11 – 1.23)	<0.001	3,898 (9.3)	0.88 (0.80 – 0.97)	0.01
Dialysis during hospitalization						
No	66,430 (93.5)	ref	-	39,195 (93.6)	Ref	
Yes	4,633 (6.5)	1.33 (1.26 – 1.41)	<0.001	2,680 (6.4)	1.14 (1.03 – 1.25)	0.01
Charlson comorbidity index						
0	19,754 (27.8)	ref	-	12,170 (29.1)	Ref	
1-2	30,414 (42.8)	NA‡	<0.001	15,669 (37.4)	1.30 (1.20 – 1.40)	<0.001
≥ 3	20,895 (29.4)	NA‡	<0.001	14,036 (33.5)	NA‡	
Length of index hospital stay						
<7 days	12,735 (17.9)	ref	-	6,048 (14.4)	Ref	-
7-13 days	19,393 (27.3)	1.29 (1.21 – 1.36)	<0.001	11,972 (28.6)	1.33 (1.19 – 1.48)	<0.001
14-20 days	12,716 (17.9)	1.48 (1.39 – 1.58)	<0.001	7,640 (18.2)	1.40 (1.25 – 1.57)	<0.001
≥ 21 days	26,219 (36.9)	1.57 (1.48 – 1.67)	<0.001	16,215 (38.8)	1.51 (1.34 – 1.69)	<0.001

Discharge destination						
Home	22,771 (31.8)	Ref	-	20,225 (48.3)	Ref	
Home with health services	15,584 (21.8)	NA‡	<0.001	9,688 (23.1)	1.36 (1.27 – 1.45)	<0.001
Other	8,806 (12.3)	NA‡	<0.001	11,962 (28.6)	NA‡	

* Results of competing risk regression, accounting for death as a competing risk for rehospitalization.
† Data missing for 267 patients in Ontario
‡ Interactions with time for these variables were significant. Therefore, there is no single hazard ratio that can be reported.
C-statistic for multivariable logistic models with the same candidate predictors in each model: NY 0.64; ON 0.62

Table E5. Length of initial hospital stay for patients, stratified by patient characteristics

Characteristic	Length of Initial Hospital Stay, median (IQR)		
	New York (n=71,063)	Ontario (n=41,875)	P Value
Sex			
Male			
Median	15 (8-29)	15 (8-29)	
Mean	23.4 (31.5)	26.0 (37.8)	< 0.001
Female			
Median	15 (8-27)	17 (9-33)	
Mean	22.5 (27.9)	28.9 (41.1)	< 0.001
Mechanical ventilation			
<96 hours without tracheostomy*			
Median	10 (6-17)	12 (7-20)	
Mean	13.8 (16.0)	17.3 (22.1)	< 0.001
≥96 hours without tracheostomy*			
Median	21 (14-32)	27 (18-44)	
Mean	26.5 (23.0)	37.5 (34.0)	< 0.001
Any mechanical ventilation with tracheostomy			
Median	42 (28-64)	62 (41-95)	
Mean	53.4 (53.7)	81.5 (80.3)	< 0.001
Dialysis during hospitalization			
No			
Median	15 (8-27)	15 (8-28)	
Mean	22.1 (29.0)	25.4 (36.9)	< 0.001
Yes - acute			
Median	31 (18-53)	36 (20-66)	
Mean	41.7 (43.0)	53.7 (59.3)	< 0.001
Yes - ESRD			
Median	19 (10-35)	27 (13-54)	
Mean	28.6 (34.2)	44.0 (53.9)	< 0.001
Charlson comorbidity index			
0			
Median	14 (6-28)	10 (6-21)	
Mean	22.8 (33.3)	19.1 (30.5)	< 0.001
1-2			
Median	15 (8-28)	16 (9-29)	
Mean	22.6 (30.2)	26.6 (39.0)	< 0.001

≥ 3			
Median	16 (10-29)	21 (12-40)	
Mean	23.5 (25.8)	34.7 (44.3)	< 0.001
Discharge destination			
Home			
Median	9 (5-16)	11 (7-17)	
Mean	13.9 (20.2)	14.8 (17.6)	< 0.001
Home with health services			
Median	16 (9-27)	20 (12-33)	
Mean	22.6 (21.9)	29.0 (33.5)	< 0.001
Other[†]			
Median	21 (12-36)	31 (16-58)	
Mean	29.4 (36.4)	46.6 (57.5)	< 0.001

[*] Tracheostomy performed at any time during hospitalization

[†] Other discharge destination in Ontario includes: long term care (3.1%) rehabilitative care (14.3%), complex continuing care (6.0%), acute care (1.2%) facilities and others (4.0%); in NY: skilled nursing facility (34.3%), rehabilitation facility (2.7%), hospice (2.4%), other hospital (3.1%), and others (3.9%).

Figure E1. Survival curve for patients from hospital discharge to 180 days