

Supplemental Online Content

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eTable 1. ICD-10 codes for patient diagnoses, comorbidities, treatment, and outcomes

eTable 2. Unadjusted outcomes in patients with out-of-hospital and in-hospital STEMI

eTable 3. Propensity-matched exploratory outcomes in patients with out-of-hospital and in-hospital STEMI

eTable 4. Propensity-matched primary and secondary outcomes in patients with out-of-hospital and in-hospital STEMI with control group from same calendar year (i.e., 2020)

eTable 5. Propensity-matched primary and secondary outcomes in patients with out-of-hospital and in-hospital STEMI after matching on center

eTable 6. Propensity-matched primary and secondary outcomes in patients with out-of-hospital and in-hospital STEMI after excluding transfer-in/-out patients

eTable 7. Primary and sensitivity analyses for in-hospital mortality in patients with out-of-hospital and in-hospital STEMI

eFigure 1. Forest plot of unadjusted outcomes in patients with out-of-hospital STEMI

eFigure 2. Forest plot of unadjusted outcomes in patients with in-hospital STEMI

eMethods

eResults

eReferences

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

eTable 1: ICD-10 codes for patient diagnoses, comorbidities, treatment, and outcomes

Diagnoses	
ST-segment elevation myocardial infarction	I21.0 = STEMI of anterior wall; I21.1 = STEMI of inferior wall; I21.2 = STEMI of other sites; I21.3 = STEMI of unspecified site
COVID-19 status	U07.1
Comorbidities	
Hypertension	I10*, I11*, I12*, I13*, I14*, I15*, I16*
Diabetes	E08*, E09*, E10*, E11*, E12*, E13*
Hyperlipidemia	E78*
History of smoking	F17*
Obesity	E65*, E66*, E67*, E68*
Chronic kidney disease	N18*
End stage renal disease	N18.6
Coronary artery disease	I20*, I21*, I22*, I23*, I24*, I25*, Z95.1, Z95.5, I25.2
Prior myocardial infarction	I25.2
Prior coronary angioplasty	Z98.61
Prior coronary artery bypass grafting	Z95.1
History of implantable cardiac defibrillator	Z95.810
History of cardiac pacemaker	Z95.0
Cerebrovascular disease	I60*, I61*, I62*, I63*, I64*, I65*, I66*, I67*, I68*, I69*, Z86.73
Prior stroke	Z86.73
Chronic lung disease	J40*, J41*, J42*, J43*, J44*, J45*, J46*, J47*
Pulmonary circulation disorders	I26*, I27*, I28*
Chronic liver disease	K70*, K71*, K72*, K73*, K74*, K75*, K76*, K77*
Chronic anemia	D50*, D51*, D52*, D53*, D55*, D56*, D57*, D58*, D59*, D60*, D61*, D62*, D63*, D64*
Coagulopathy	D65*, D66*, D67*, D68*, D69*
Valvular heart disease	I05, I06, I07, I08, I09, I34, I35, I36, I37, I38*, Z95.2
Heart failure	I50*
Cardiac arrest	I46.9
Hypothyroidism	E02*, E03*
Treatment	
Systemic fibrinolytic therapy	Z92.82, 3E04317, 3E03317

Left heart catheterization	B211010, B211110, B211Y10, B213010, B213110, B213Y10, B2150ZZ, B2151ZZ, B215YZZ, B2140ZZ, B2141ZZ, B214YZZ, B2160ZZ, B2161ZZ, B216YZZ, B2170ZZ, B2171ZZ, B217YZZ, B2180ZZ, B2181ZZ, B218YZZ, B21F0ZZ, B21F1ZZ, B21FYZZ, B2110ZZ, B2111ZZ, B211YZZ, B2130ZZ, B2131ZZ, B213YZZ, 4A023N7
Coronary angiography	B2110ZZ, B211010, B211110, B2111ZZ, B211Y10, B211YZZ, B210010, B2100ZZ, B210110, B2101ZZ, B210Y10, B210YZZ
Right heart catheterization	4A0239Z, 4A023N6, 4A023N8
Balloon angioplasty	02703Z6, 02703ZZ, 02713Z6, 02713ZZ, 02723Z6, 02723ZZ, 02733Z6, 02733ZZ, 02704Z6, 02704ZZ, 02714Z6, 02714ZZ, 02724Z6, 02724ZZ, 02734Z6, 02734ZZ
Insertion of Drug-eluting stent	0270346, 027034Z, 0270356, 027035Z, 0270366, 027036Z, 0270376, 027037Z, 0271346, 027134Z, 0271356, 027135Z, 0271366, 027136Z, 0271376, 027137Z, 0272346, 027234Z, 0272356, 027235Z, 0272366, 027236Z, 0272376, 027237Z, 0273346, 027334Z, 0273356, 027335Z, 0273366, 027336Z, 0273376, 027337Z, 0270446, 027044Z, 0270456, 027045Z, 0270466, 027046Z, 0270476, 027047Z, 0271446, 027144Z, 0271456, 027145Z, 0271466, 027146Z, 0271476, 027147Z, 0272446, 027244Z, 0272456, 027245Z, 0272466, 027246Z, 0272476, 027247Z, 0273446, 027344Z, 0273456, 027345Z, 0273466, 027346Z, 0273476, 027347Z
Insertion of bare-metal stent	02703D6, 02703DZ, 02703E6, 02703EZ, 02703F6, 02703FZ, 02703G6, 02703GZ, 02713D6, 02713DZ, 02713E6, 02713EZ, 02713F6, 02713FZ, 02713G6, 02713GZ, 02723D6, 02723DZ, 02723E6, 02723EZ, 02723F6, 02723FZ, 02723G6, 02723GZ, 02733D6, 02733DZ, 02733E6, 02733EZ, 02733F6, 02733FZ, 02733G6, 02733GZ, 02704D6, 02704DZ, 02704E6, 02704EZ, 02704F6, 02704FZ, 02704G6, 02704GZ, 02714D6, 02714DZ, 02714E6, 02714EZ, 02714F6, 02714FZ, 02714G6, 02714GZ, 02724D6, 02724DZ, 02724E6, 02724EZ, 02724F6, 02724FZ, 02724G6, 02724GZ, 02734D6, 02734DZ, 02734E6, 02734EZ, 02734F6, 02734FZ, 02734G6, 02734GZ
Coronary artery bypass grafting	021209W, 021109W, 02100Z9, 02120Z9
Use of mechanical circulatory support	
- Intra-aortic balloon pump (IABP)	5A02210
- Extracorporeal membrane oxygenation (ECMO)	5A1522F, 5A1522G, 5A1522H
- Left ventricular assist device (LVAD)	02HA3RJ, 02HA3RZ
Outcomes	

Myocardial infarction	I21*, I22*
Ischemic stroke	I63*, I65*, I66*
Acute decompensated heart failure	I50.21, I50.23, I50.31, I50.33, I50.41, I50.43, I50.811, I50.813, I50.1, I50.82, I50.83, I50.84, I50.89, I50.9, I50.2, I50.4, I50.3, I50.81*
Cardiogenic shock	R570
Mechanical complications	
- Papillary muscle rupture	I235, I512
- Ventricular septal defect	I232
- Free wall rupture	I233
Major bleeding - Gastrointestinal hemorrhage	I8501, I8511, K644*, K648*, K226*, K228*, K250*, K256*, K260*, K266*, K270*, K276*, K280*, K286*, K2901, K2911, K2921, K2931, K2941, K2951, K2961, K2971, K2981, K2991, K5701, K5711, K5713, K5721, K5731, K5733, K5741, K5751, K5753, K5781, K5791, K5793, K625, K5521, K920*, K921*, K922*, K31811, K661*
- Cerebral hemorrhage	I60*, I61*, I62*
- Other major bleeding	R310*, R311*, R312*, R319*, M25019, R040*, R041*, R042*, R0481, R0489, R049, I312*, R58*, S064X0A, S064X1A, S064X2A, S064X3A, S064X4A, S064X5A, S064X6A, S064X7A, S064X8A, S064X9A, S065X0A, S065X1A, S065X2A, S065X3A, S065X4A, S065X5A, S065X6A, S065X7A, S065X8A, S065X9A, S066X0A, S066X1A, S066X2A, S066X3A, S066X4A, S066X5A, S066X6A, S066X7A, S066X8A, S066X9A
Blood transfusion:	30243N0, 30243N1, 30243P0, 30243P1, 30243H0, 30243H1, 30240N0, 30240N1, 30240P0, 30240P1, 30240H0, 30240H1, 30230H0, 30230H1, 30230N0, 30230N1, 30230P0, 30230P1, 30233N0, 30233N1, 30233P0, 30233P1
Acute kidney injury	N17, N19, N990, R34, R944
Pneumonitis	J69*
Acute respiratory failure	I96*
Encephalopathy	G93.40
Septic shock	R65.21

eTable 2: Unadjusted outcomes in patients with out-of-hospital and in-hospital STEMI

Outcome	Out-of-hospital STEMI				In-hospital STEMI			
	Patients with COVID-19 (n=565)	Patients without COVID-19 (n=75869)	Absolute difference (95% CI)	P- value	Patients with COVID-19 (n=359)	Patients without COVID-19 (n=3656)	Absolute difference (95% CI)	P- value
Primary Outcome								
In-hospital death, n (%)	87 (15.4%)	6856 (9.0%)	6.4 (3.38, 9.34)	< .001	287 (79.9%)	1418 (38.8%)	41.2 (37.84, 44.48)	< .001
Secondary outcomes								
Composite of death, stroke, or MI, n (%)	103 (18.2%)	8067 (10.6%)	12.4 (8.9, 15.85)	< .001	296 (82.5%)	1652 (45.2%)	37.3 (34.11, 40.42)	< .001
Composite of death or stroke, n (%)	103 (18.2%)	7980 (10.5%)	7.7 (4.52,10.9)	< .001	296 (82.5%)	1638 (44.8%)	37.7 (34.49, 40.8)	< .001

Acute decompensated HF, n (%)	185 (32.7%)	23911 (31.5%)	1.2 (-2.66, 5.11)	.53	131 (36.5%)	1855 (50.7%)	-14.3 (-18.23, -10.26)	< .001
Cardiogenic shock, n (%)	103 (18.2%)	12783 (16.8%)	1.4 (-1.81, 4.58)	.38	91 (25.3%)	995 (27.2%)	-1.9 (-5.47, 1.73)	.45
Exploratory outcomes								
Mechanical complications, n (%)	4 (0.7%)	432 (0.6%)	0.1 (-0.55, 0.83)	.66	0 (0.0%)	16 (0.4%)	-0.4 (-0.48, -0.39)	.21
Any bleeding, n (%)	55 (9.7%)	5223 (6.9%)	2.9 (0.4, 5.3)	.007	97 (27.0%)	947 (25.9%)	1.1 (-2.56, 4.79)	.64
Blood transfusion, n (%)	30 (5.3%)	2961 (3.9%)	1.4 (-0.45, 3.26)	.08	64 (17.8%)	703 (19.2%)	-1.4 (-4.57, 1.77)	.52
Acute kidney injury, n (%)	165 (29.2%)	16381 (21.6%)	7.6 (3.85, 11.37)	< .001	256 (71.3%)	1955 (53.5%)	17.8 (14.09, 21.58)	< .001

Mechanical ventilation, n (%)	120 (21.2%)	10524 (13.9%)	7.4 (4.5, 10.23)	< .001	279 (77.7%)	1684 (46.1%)	31.7 (26.24, 37.07)	< .001
Encephalopathy, n (%)	40 (7.1%)	3174 (4.2%)	2.9 (1.24, 4.56)	< .001	90 (25.1%)	739 (20.2%)	4.9 (0.47, 9.24)	.03
Septic shock, n (%)	34 (6.0%)	1610 (2.1%)	3.9 (2.69, 5.1)	< .001	173 (48.2%)	773 (21.1%)	27 (22.45, 31.65)	< .001
Pneumonitis, n (%)	20 (3.5%)	2855 (3.8%)	-0.2 (-1.8, 1.35)	.78	29 (8.1%)	414 (11.3%)	-3.2 (-6.64, 0.15)	.06
Acute respiratory failure, n (%)	0 (0.0%)	124 (0.2%)	-0.2 (-0.5, 0.17)	.34	4 (1.1%)	51 (1.4%)	-0.3 (-1.54, 0.98)	.66
ICU stay (days), median (IQR)	1.0 (0.0, 3.0)	1.0 (0.0, 2.0)	0.9 (-0.04, 1.82)	.06	7.0 (1.0, 15.0)	3.0 (1.0, 8.0)	3.5 (2.1, 4.8)	< .001
Length of stay (days), median (IQR)	3.0 (2.0, 7.0)	3.0 (2.0, 5.0)	2.2 (1.63, 2.82)	< .001	13.0 (8.0, 24.0)	10.0 (5.0, 18.0)	2.7 (0.7, 4.6)	.008

Total cost (US dollars), median (IQR)	19816.0 (13325.0, 33703.0)	16998.0 (11912.0, 27981.0)	5907 (1390, 10422)	.01	50819.0 (28363.0, 87299.0)	44535.0 (24349.0, 81920.5)	1235 (-11099, 13570)	.84
Discharge disposition among survivors, n (%)				< .001				.002
Routine/Home	343 (72.2%)	55046 (80.6%)	-8.4 (-12.1, -4.69)		16 (22.2%)	693 (31.2%)	-8.6 (-12.01, -5.12)	
Short term hospitalization	1 (0.2%)	170 (0.2%)	-0.04 (-0.42, 0.34)		1 (1.4%)	11 (0.5%)	0.9 (-0.07, 1.87)	
SNF	32 (6.7%)	3059 (4.5%)	2.3 (0.19, 4.33)		15 (20.8%)	423 (19.0%)	2.0 (-1.32, 5.4)	
ICF	13 (2.7%)	1444 (2.1%)	0.6 (-0.73, 1.97)		7 (9.7%)	233 (10.5%)	-0.6 (-3.08, 1.82)	
Another type of facility	16 (3.4%)	755 (1.1%)	2.3 (0.77, 3.75)		12 (16.7%)	121 (5.4%)	11.3 (8.21, 14.37)	

HHC	56 (11.8%)	6745 (9.9%)	1.9 (-0.75, 4.58)		11 (15.3%)	491 (22.1%)	-6.5 (-9.52, -3.55)	
Hospice	14 (2.9%)	1073 (1.6%)	1.4 (-0.02, 2.77)		10 (13.9%)	249 (11.2%)	1.5 (- 1.37,4.36)	
30-day re- admission, n (%)	36 (6.4%)	5524 (7.3%)	-0.9 (-2.93, 1.11)	.41	13 (3.6%)	423 (11.6%)	-7.9 (-9.51, -6.39)	< .001

eTable 3: Propensity-matched exploratory outcomes in patients with out-of-hospital and in-hospital STEMI

Exploratory Outcome	Out-of-hospital STEMI				In-hospital STEMI			
	Patients with COVID-19 (n=551)	Patients without COVID-19 (n=2755)	Absolute difference (95% CI)	P-value	Patients with COVID-19 (n=252)	Patients without COVID-19 (n=756)	Absolute difference (95% CI)	P-value
Mechanical complications, n (%)	4 (0.7%)	22 (0.8%)	-0.07 (-0.78, 0.63)	.86	0 (0.0%)	3 (0.4%)	-0.4 (-1.17, 0.38)	.32
Any bleeding, n (%)	55 (10.0%)	230 (8.3%)	1.6 (-0.85, 4.11)	.21	68 (27.0%)	188 (24.9%)	2.1 (-4.09, 8.32)	.50
Blood transfusion, n (%)	30 (5.4%)	149 (5.4%)	0.04 (-1.84, 1.91)	.97	53 (21.0%)	123 (16.3%)	4.8 (-0.65, 10.17)	.08
Acute kidney injury, n (%)	160 (29.0%)	670 (24.3%)	4.7 (0.96, 8.47)	.02	177 (70.2%)	409 (54.1%)	16.1 (9.1, 23.17)	< .001
Mechanical ventilation, n (%)	117 (21.2%)	465 (16.9%)	4.4 (0.87, 7.84)	.01	188 (74.6%)	361 (47.8%)	26.9 (19.75, 33.95)	< .001

Encephalopathy, n (%)	36 (6.5%)	125 (4.5%)	2 (0.03, 3.97)	.05	68 (27.0%)	135 (17.9%)	9.1 (3.41, 14.84)	.001
Septic shock, n (%)	32 (5.8%)	70 (2.5%)	3.3 (1.69, 4.85)	< .001	118 (46.8%)	171 (22.6%)	24.2 (17.76, 30.65)	< .001
Pneumonitis, n (%)	18 (3.3%)	126 (4.6%)	-1.3 (-3.17, 0.56)	.17	25 (9.9%)	83 (11.0%)	-1.1 (-5.47, 3.35)	.64
Acute respiratory failure, n (%)	0 (0.0%)	6 (0.2%)	-0.2 (-0.61, 0.17)	.27	3 (1.2%)	8 (1.1%)	0.1 (-1.35, 1.61)	.86
Intensive care unit stay (days), median (IQR)	1.0 (0.0, 3.0)	1.0 (0.0, 3.0)	-0.3 (-3.1, 2.5)	.82	7.0 (1.0, 15.0)	3.0 (1.0, 7.0)	4.47 (2.51, 6.42)	< .001
Length of stay (days), median (IQR)	3.0 (2.0, 7.0)	3.0 (2.0, 6.0)	1.3 (0.36, 2.23)	.006	14.0 (9.0, 25.5)	9.0 (4.0, 17.5)	3.64 (0.81, 6.46)	.01
Total cost (US dollars), median (IQR)	19854.0 (13325.0, 33703.0)	17658.0 (12012.0, 32326.0)	1381 (-5533, 8296)	.70	52723.0 (31652.0, 92200.0)	38477.0 (23113.0, 67002.0)	6203 (-11282, 23687)	.49
Discharge disposition among survivors, n (%)				.01				< .01

Routine/Home	336 (72.3%)	1903 (78.4%)	-6.2 (-9.89, -2.48)		11 (18.6%)	150 (35.8%)	-17.2 (- 30.04, - 4.27)	
Short term hospitalization	1 (0.2%)	14 (0.6%)	-0.4 (-0.75, 0.02)		1 (1.7%)	3 (0.7%)	1 (-1.5, 3.46)	
Skilled nursing facility	32 (6.9%)	126 (5.2%)	1.7 (-0.41, 3.78)		13 (22.0%)	65 (15.5%)	6.5 (-3.55, 16.59)	
Intermediate care facility	13 (2.8%)	55 (2.3%)	0.5 (-0.83, 1.89)		7 (11.9%)	42 (10.0%)	1.8 (-6.43, 10.11)	
Another type of facility	15 (3.2%)	37 (1.5%)	1.7 (0.24, 3.16)		12 (20.3%)	22 (5.3%)	15.1 (8.08, 22.09)	
Home health care	54 (11.6%)	250 (10.3%)	1.3 (-1.34, 3.96)		8 (13.6%)	88 (21.0%)	-7.4 (-18.36, 3.48)	
Hospice	14 (3.0%)	41 (1.7%)	1.3 (-0.09, 2.73)		7 (11.9%)	49 (11.7%)	0.2 (-8.6, 8.94)	
30-day re- admission, n (%)	34 (6.2%)	245 (8.9%)	-2.7 (-4.72, -0.73)	.04	10 (4.0%)	76 (10.1%)	-6.1 (-10.07, -2.1)	< .001
Abbreviations:								

CI= confidence interval; IQR= inter-quartile range; STEMI= ST elevation myocardial infarction.

eTable 4: Propensity-matched primary and secondary outcomes in patients with out-of-hospital and in-hospital STEMI with control group from same calendar year (i.e., 2020)

Outcome	Out-of-hospital STEMI				In-hospital STEMI			
	Patients with COVID-19 (n= 547)	Patients without COVID-19 (n= 2735)	Absolute difference, % (95% CI)	P-value	Patients with COVID-19 (n = 337)	Patients without COVID-19 (n= 337)	Absolute difference, % (95% CI)	P-value
Primary outcome								
In-hospital death, n (%)	84 (15.4%)	303 (11.1%)	4.3 (1.1, 7.5)	.004	267 (79.2%)	168 (49.9%)	29.4 (22.5, 36.2)	< .001
Secondary outcomes								
Composite of death, stroke, or MI, n (%)	95 (17.4%)	371 (13.6%)	3.8 (0.4, 7.2)	.02	276 (81.9%)	186 (55.2%)	26.7 (20, 33.4)	< .001
Composite of death or stroke, n (%)	95 (17.4%)	367 (13.4%)	3.9 (0.5, 7.4)	.02	276 (81.9%)	186 (55.2%)	26.7 (20, 33.4)	< .001

Acute decompensated HF, n (%)	171 (31.3%)	850 (31.1%)	0.2 (-4, 4.4)	.93	126 (37.4%)	149 (44.2%)	-6.8 (-14.2, 0.5)	.07
Cardiogenic shock, n (%)	101 (18.5%)	438 (16.0%)	2.4 (-1.1, 6)	.16	88 (26.1%)	89 (26.4%)	-0.3 (-6.9, 6.3)	.93

eTable 5: Propensity-matched primary and secondary outcomes in patients with out-of-hospital and in-hospital STEMI after matching on center

Outcome	Out-of-hospital STEMI				In-hospital STEMI			
	Patients with COVID-19 (n= 440)	Patients without COVID-19 (n= 440)	Absolute difference, % (95% CI)	P-value	Patients with COVID-19 (n = 181)	Patients without COVID-19 (n= 181)	Absolute difference, % (95% CI)	P-value
Primary outcome								
In-hospital death, n (%)	66 (15.0%)	38 (8.6%)	6.4 (2.1, 10.6)	.003	134 (74.0%)	83 (45.9%)	28.2 (18.6, 37.8)	< .001
Secondary outcomes								
Composite of death, stroke, or MI, n (%)	74 (16.8%)	50 (11.4%)	5.5 (0.9, 10)	.02	140 (77.3%)	88 (48.6%)	28.7 (19.3, 38.2)	< .001
Composite of death or stroke, n (%)	74 (16.8%)	50 (11.4%)	5.5 (0.9 ,10)	.02	140 (77.3%)	88 (48.6%)	28.7 (19.3, 38.2)	< .001

Acute decompensated HF, n (%)	144 (32.7%)	130 (29.5%)	3.2 (-2.9, 9.3)	.31	69 (38.1%)	75 (41.4%)	-3.3 (-13.3, 6.7)	.52
Cardiogenic shock, n (%)	83 (18.9%)	65 (14.8%)	4.1 (-0.8, 9)	.10	49 (27.1%)	45 (24.9%)	2.2 (-6.8, 11.2)	.63

eTable 6: Propensity-matched primary and secondary outcomes in patients with out-of-hospital and in-hospital STEMI after excluding transfer-in/-out patients

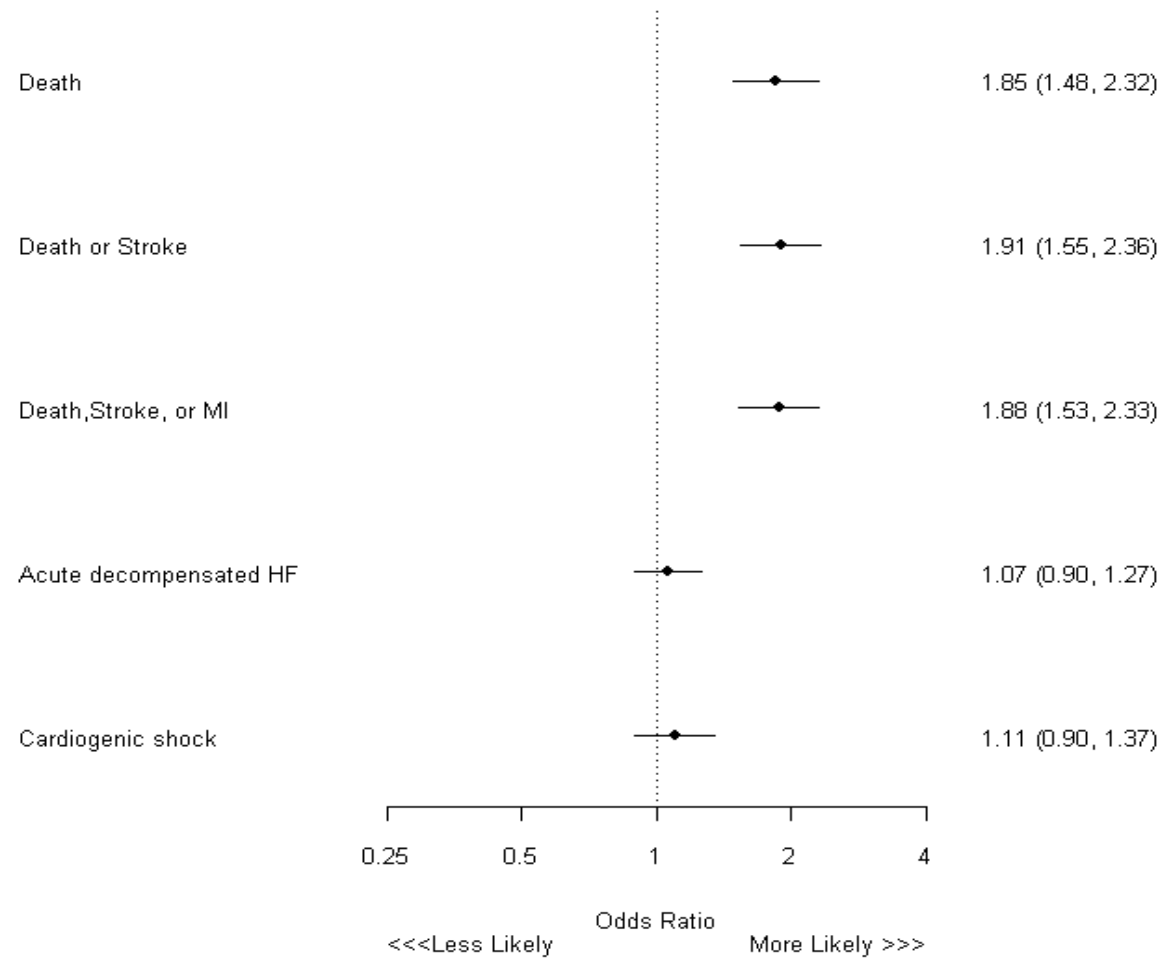
Outcome	Out-of-hospital STEMI				In-hospital STEMI			
	Patients with COVID-19 (n= 417)	Patients without COVID-19 (n= 2085)	Absolute difference, % (95% CI)	P-value	Patients with COVID-19 (n= 195)	Patients without COVID-19 (n= 585)	Absolute difference, % (95% CI)	P-value
Primary outcome								
In-hospital death, n (%)	59 (14.1%)	214 (10.3%)	3.9 (0.3, 7.5)	.02	149 (76.4%)	247 (42.2%)	34.2 (27, 41.3)	< .001
Secondary outcomes								
Composite of death, stroke, or MI, n (%)	69 (16.5%)	257 (12.3%)	4.2 (0.4, 8)	.02	155 (79.5%)	287 (49.1%)	30.4 (23.5, 37.4)	< .001
Composite of death or stroke, n (%)	69 (16.5%)	256 (12.3%)	4.3 (0.5, 8.1)	.02	155 (79.5%)	283 (48.4%)	31.1 (24.2, 38)	< .001

Acute decompensated HF, n (%)	119 (28.5%)	584 (28.0%)	0.5 (-4.2, 5.2)	.83	84 (43.1%)	261 (44.6%)	-1.5 (-9.5, 6.5)	.71
Cardiogenic shock, n (%)	68 (16.3%)	301 (14.4%)	1.9 (-2, 5.7)	.33	55 (28.2%)	127 (21.7%)	6.5 (-0.6, 13.6)	.06

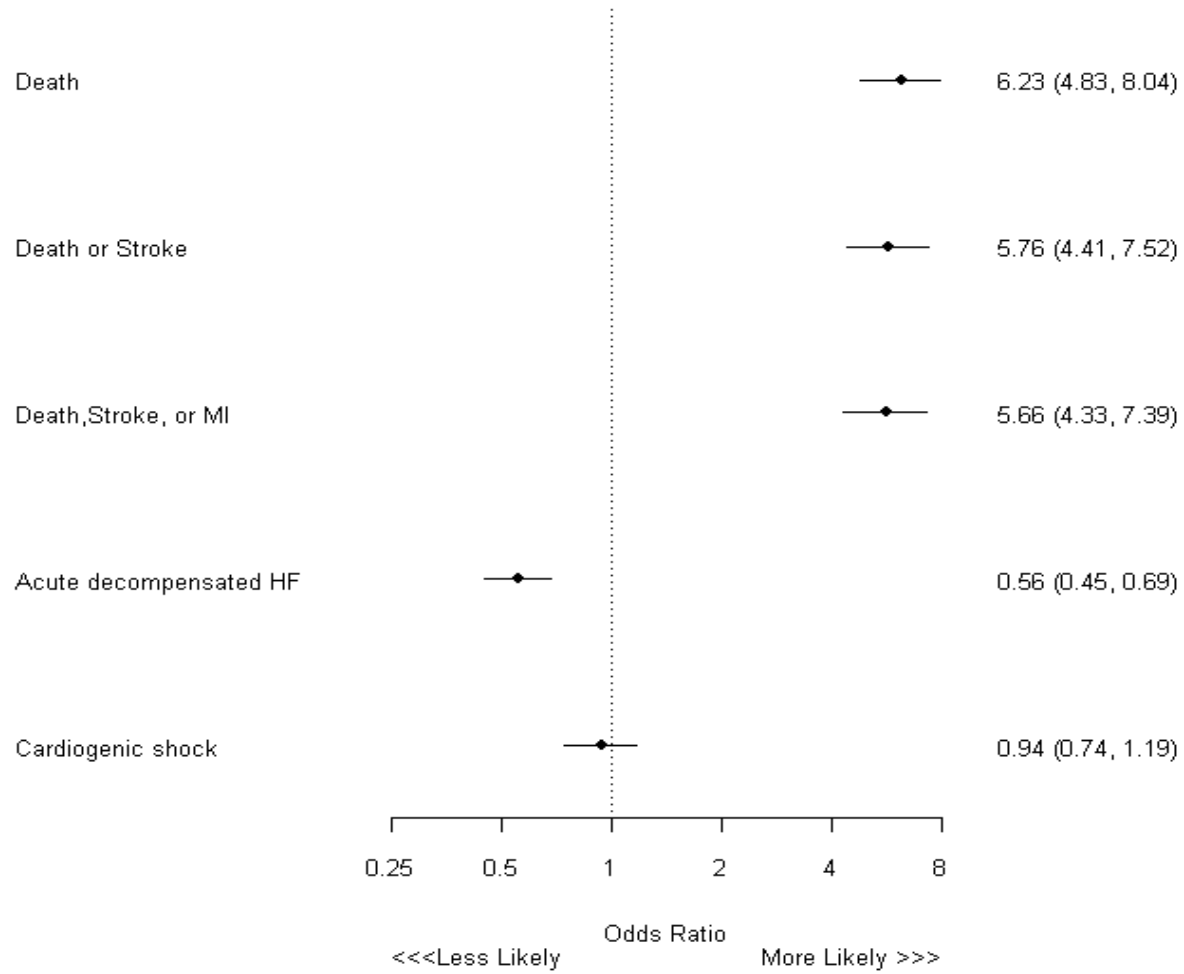
eTable 7: Primary and sensitivity analyses for in-hospital mortality in patients with out-of-hospital and in-hospital STEMI

Model	Out-of-hospital STEMI			In-hospital STEMI		
	OR	95% CI	P value	OR	95% CI	P value
Main analysis	1.43	1.1, 1.86	.007	4.11	2.97, 5.69	< .001
Sensitivity analysis (2020 control group)	1.46	1.12, 1.89	.004	3.84	2.73, 5.38	.001
Sensitivity analysis (matched on center)	1.87	1.22, 2.85	.003	3.37	2.16, 5.24	< .001
Sensitivity analysis (transfers excluded)	1.44	1.06, 1.96	.02	4.43	3.06, 6.41	< .001
Sensitivity analysis (multivariable regression following propensity score matching)	1.60	1.17, 2.19	.003	5.77	3.93, 8.46	< .0001

eFigure 1: Forest plot of unadjusted outcomes in patients with out-of-hospital STEMI



eFigure 2: Forest plot of unadjusted outcomes in patients with in-hospital STEMI



eMethods:

A) ICU type:

The Vizient Clinical Database provides detailed information about ICU type. ICU types provided include Bone Marrow Transplant ICU; Burn Care ICU; Burn Intermediate Unit (Step Down); Cardiac Intermediate Unit (Step Down); Cardio/Thoracic ICU with Transplant; Cardio/Thoracic ICU W/O Transplant; Cardiovascular Surgical ICU; Coronary Cardiac ICU (CCU); Medical /Surgical / Cardiac Intermediate Unit (Step Down); Medical / Surgical / Cardiac ICU; Medical ICU; Medical/ Surgical ICU; Medical/Cardiac ICU; Medical/Surgical Intermediate Unit (Step Down); Neonatal Intermediate Unit (Step Down); Neurology / Neurosurgical ICU; Neonatal ICU; Pediatric ICU; Pediatric Intermediate Unit (Step Down); Respiratory Intermediate Unit (Step Down); Surgical ICU; Transplant ICU; Transplant Intermediate Unit (Step Down); Trauma (ICU and Resuscitation); Other ICU; Other Intermediate Unit (Step Down); and Unknown.

For simplification, these categories were collapsed into medical ICU, cardiac ICU, other ICU, cardiac stepdown, other stepdown, and other.

B) Elixhauser Comorbidity Score:

The Vizient Clinical Database provides the Elixhauser comorbidity score for every patient. The Elixhauser comorbidity index was initially developed by Elixhauser et al.¹ and consisted of 30 comprehensive comorbidity categories based on ICD-9-CM coding found in hospital abstracts data. The aim of the index was to provide an overall summative measure of comorbidity for use in

administrative databases for prediction of hospital charges, length of stay, and in-hospital mortality. In 2005, Quan et al, modified the index for use with ICD-10 codes.² In 2009, van Walraven et al. modified the Elixhauser Comorbidity Index into a scoring system that weighted each comorbidity group according to how predictive it was of in-hospital mortality.³ Each person's Elixhauser comorbidity score was calculated by summing the points (positive and negative) of all Elixhauser comorbidity groups that were present. Elixhauser comorbidity score is widely utilized in studies involving administrative and claims data. Further, in patients admitted with COVID-19, the Elixhauser comorbidity score was a reliable predictor of critical illness as well as length of hospital stay.

C) Variables included in propensity models for main analysis and in multivariable regression for sensitivity analyses^{a b}:

- **Patient characteristics**
 - Age
 - Sex
 - Race
 - Hispanic ethnicity
 - Payer (Medicaid, Medicare, Private, Other)
 - Hypertension
 - Diabetes mellitus

- Hyperlipidemia
- Smoking
- Obesity
- Chronic kidney disease
- End-stage renal disease
- Coronary artery disease
- Coronary artery bypass grafting
- Cerebrovascular disease
- Rheumatic heart disease
- Pulmonary circulation disorder
- Interstitial lung disease
- Chronic lung disease
- Chronic liver disease
- Obstructive sleep apnea
- Hypothyroidism
- Venous thromboembolism
- Chronic anemia

- Coagulopathy
- Valvular heart disease
- Heart failure on admission
- Cardiac arrest on admission
- Elixhauser score
- **Facility Characteristics**
 - Number of Beds
 - ICU type
 - Urban/Rural hospital
 - Region (Midwest, Northeast, Southeast, Southwest, West)
 - Hospital Ownership (Governmental, Proprietary, Voluntary)
 - Average number of patients with STEMI treated per year

^a Of 20 variables employed for propensity matching and multivariable regression, only 6 (all categorical) had missing data (summarized in eResults)

^b In the out-of-hospital STEMI cohort, all characteristics were well matched, i.e., standardized mean difference < .10, except for admission source (.23), percent of hospital occupancy at time of admission (.15), ICU occupancy (.14). In the in-hospital

STEMI cohort, all characteristics were well matched, i.e., standardized mean difference < .10, except for age (.11), race (.13), admission source (.31), region (.12), ICU occupancy (.36), prior MI (.13).

D) ICD-10 code validation:

In a study by Kokotailo et al, the positive predictive value for utilizing ICD-10 codes for stroke was 92% (95% CI 88 to 95) with perfect agreement between coder and researcher (Kappa statistic 0.89, 95% CI 0.82 to 0.96).⁴ In a study by Park et al, the positive predictive value for myocardial infarction reached 92.0%.⁵ For cardiogenic shock, positive predictive value of ICD-10 code was 96% in a study by Lauridsen et al.⁶ For heart failure, in a meta-analysis of the 11 studies reporting sensitivity and specificity values, the pooled sensitivity was 75.3% (95% CI: 74.7–75.9) and specificity was 96.8% (95% CI: 96.8–96.9).⁷ Regarding the exploratory outcomes, the validation of AKI was less robust. In a study that validated AKI at the time of hospital admission using ICD-10 codes in the elderly population, sensitivity was 61.6% (95% CI 57.5% to 65.5%) and specificity > 95%.⁸ In another study that validated the ICD-10 code for AKI in patients following kidney transplant, the sensitivity and specificity were 42.1% (95% CI 31.7, 53.3), and 90.6% (95% CI 87.6, 93.0), respectively.⁹ These 2 studies suggest that ICD-10 codes are likely to underestimate the true incidence of AKI. For mechanical ventilation, the ICD-9 code has a sensitivity of 50% and specificity of >99%.¹⁰ For ICD-10 codes, a study showed that procedure codes for mechanical ventilation have high specificity (96.0%; 95% CI 95.8–96.2), but only moderate sensitivity (58.4%; 95% CI 57.7–59.1), with a positive predictive value of 89.6% (95% CI 89.1–90.1) and negative predictive value of 79.7% (95% CI 79.4–

80.1).¹¹ ICD-10 codes for GI bleeding and intracranial hemorrhage have a PPV of 92.0% and 71.5%, respectively.⁵ Studies validating the ICD-10 codes for the remainder of the exploratory outcomes are lacking.

E) Multivariable regression:

In a sensitivity analysis of the primary study outcome, multivariable logistic regression was performed following propensity matching, with active COVID infection entered as the primary exposure variable, and the variables listed above in eMethods C included as covariates. In the out-of-hospital STEMI cohort, there were 392 deaths, while in the in-hospital cohort there were 528 deaths. That number of events provided approximately 40-50 degrees of freedom; in keeping with the 10 events per variable rule, the multivariable model was able to accommodate the covariate list above without concern for model saturation. Odds ratio and 95% confidence intervals were reported.

eResults:

Simple imputation was used for variables with missing data, employing the most frequently observed category among those with non-missing values. Approximately 9% were missing ethnicity and were imputed to non-Hispanic, 2.7% were missing race and were imputed to Caucasian, 3% were missing bed size and were imputed to >500, 3% were missing teaching status and were imputed to teaching, 3% were missing Urban/Rural and were imputed to Urban, 3% were missing ownership and were imputed to voluntary.

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