

## **SUPPLEMENTARY MATERIAL**

### **Concomitant Sepsis Diagnoses in Acute Myocardial Infarction-Cardiogenic Shock: 15-Year National Temporal Trends, Management, and Outcomes**

Jacob C Jentzer, MD; Anusha G Bhat, MD; Sri Harsha Patlolla, MBBS; Shashank S Sinha, MD  
MSc; P Elliott Miller, MD; Patrick R Lawler, MD MPH; Sean van Diepen, MD MSc; Ashish K  
Khanna, MD; David X Zhao, MD PhD; Saraschandra Vallabhajosyula, MD MSc

**Supplementary Table 1. Administrative codes used for identification of diagnoses and procedures**

<b>Comorbidity</b>	<b>International Classification of Diseases 9.0 Clinical Modification codes</b>
Sepsis diagnosis	038.0, 038.10, 038.11, 038.19, 038.2, 038.3, 038.4, 038.40, 038.41, 038.42, 038.43, 038.44, 038.49, 038.8, 038.9, 790.7, 117.9, 112.5, 115.04, 115.14, 115.94, 112.81, 112.83, 003.1, 003.21, 036.2, 036.3, 036.0, 036.1, 036.42, 020.2, 022.3, 098.89, 098.84, 098.82, 995.92, 785.52
Cardiac arrest	427.5, 427.41, 99.60, 99.63
Coronary angiography	37.22, 37.23, 88.53-88.56
Percutaneous coronary intervention	00.66, 36.01, 36.02, 36.05, 36.06, 36.07, 88.57
Invasive hemodynamic assessment	89.63, 89.64, 89.66, 89.67, 89.68
Mechanical circulatory support	37.61, 37.68, 39.65
Invasive mechanical ventilation	96.7, 96.70, 96.71, 96.72
Hemodialysis	39.95
Hepatic failure	570.0, 572.2, 573.3, 573.4
Respiratory failure	518.81, 518.82, 518.85, 786.09, 799.1, 96.7, 96.70, 96.71, 96.72
Renal failure	584, 584.5, 584.6, 584.7, 584.8, 584.9
Hematologic failure	286.6-286.9, 287.4, 287.5
Neurological failure	293, 293.0, 293.1, 293.8, 293.81-293.84, 293.89, 293.9, 348.1, 348.3, 348.30, 348.81, 348.39, 780.01, 780.09, 89.14

**Supplementary Table 2. Multivariable regression for in-hospital mortality in AMI-CS**

Total cohort (N=444,253)		Odds ratio	95% confidence interval		P
			Lower Limit	Upper Limit	
No Sepsis Diagnoses		Reference category			
Sepsis Diagnoses		1.21	1.18	1.25	<0.001
Age (years)	<75 years	Reference category			
	>75 years	1.95	1.92	1.98	<0.001
Female sex		1.1	1.08	1.12	<0.001
Race	White	Reference category			
	Black	0.93	0.89	0.95	<0.001
	Others <sup>a</sup>	1.06	1.04	1.07	<0.001
Primary payer	Medicare	Reference category			
	Medicaid	0.71	0.69	0.73	<0.001
	Private	0.62	0.61	0.64	<0.001
	Others <sup>b</sup>	0.91	0.88	0.93	<0.001
Year	2000-2005	Reference Category			
	2006-2011	0.65	0.64	0.66	<0.001
	2012-2014	0.58	0.57	0.6	<0.001
Quartile of median household income for zip code	0-25 <sup>th</sup>	Reference category			
	26 <sup>th</sup> -50 <sup>th</sup>	0.99	0.97	1.01	0.36
	51 <sup>st</sup> -75 <sup>th</sup>	0.96	0.94	0.98	<0.001
	75 <sup>th</sup> -100 <sup>th</sup>	0.94	0.922	0.96	<0.001
Hospital teaching status and location	Rural	Reference category			
	Urban Non-Teaching	1.04	1.01	1.07	0.006
	Urban Teaching	1.15	1.12	1.19	<0.001

<b>Hospital bed-size</b>	<b>Small</b>	Reference category			
	<b>Medium</b>	1.04	1.01	1.07	0.006
	<b>Large</b>	1.08	1.05	1.11	<0.001
<b>Hospital region</b>	<b>Northeast</b>	Reference category			
	<b>Midwest</b>	0.96	0.94	0.98	0.001
	<b>South</b>	1.05	1.03	1.07	<0.001
	<b>West</b>	0.94	0.92	0.96	<0.001
<b>Charlson Comorbidity Index</b>	<b>0-3</b>	Reference category			
	<b>4-6</b>	1.30	1.27	1.32	<0.001
	<b>≥ 7</b>	1.33	1.30	1.37	0.003
<b>Type of AMI</b>	<b>ST-segment elevation</b>	Reference category			
	<b>Non-ST-segment elevation</b>	0.68	0.67	0.69	<0.001
<b>Multi-organ failure</b>		1.46	1.44	1.49	<0.001
<b>Cardiac arrest</b>		3.15	3.10	3.20	<0.001
<b>Atrial fibrillation</b>		0.86	0.85	0.87	<0.001
<b>Atrial flutter</b>		0.62	0.60	0.65	<0.001
<b>Coronary angiography</b>		0.54	0.53	0.55	<0.001
<b>Percutaneous coronary intervention</b>		0.48	0.47	0.49	<0.001
<b>Coronary artery bypass grafting</b>		0.35	0.34	0.36	<0.001
<b>Pulmonary artery catheterization</b>		0.98	0.96	1.01	0.27
<b>Mechanical circulatory support</b>		1.27	1.25	1.29	<0.001
<b>Non-invasive mechanical ventilation</b>		0.67	0.64	0.70	<0.001
<b>Invasive mechanical ventilation</b>		1.59	1.57	1.62	<0.001
<b>Acute hemodialysis</b>		1.64	1.58	1.70	<0.001

**Legend:** <sup>a</sup>Hispanic, Asian or Pacific Islander, Native American, Others; <sup>b</sup>Self-Pay, No Charge, Others

**Abbreviations:** AMI: acute myocardial infarction; CS: cardiogenic shock

**Supplementary Table 3: Baseline characters contrasting sepsis and septic shock diagnoses  
in AMI-CS**

Characteristic		Sepsis Diagnosis (N=13,993)	Septic shock diagnosis (N=13,066)	<i>P</i>
<b>Age (years)</b>		68 ± 13	69 ± 12.5	<0.001
<b>Female</b>		36.1	35.8	0.70
<b>Race</b>	<b>White</b>	61.1	58.9	<0.001
	<b>Black</b>	7.5	8.8	
	<b>Others<sup>a</sup></b>	31.4	32.3	
<b>Primary payer</b>	<b>Medicare</b>	59.0	63.2	<0.001
	<b>Medicaid</b>	9.4	8.9	
	<b>Private</b>	23.9	19.7	
	<b>Others<sup>b</sup></b>	7.8	8.2	
<b>Quartile of median household income for zip code</b>	<b>0-25<sup>th</sup></b>	25.7	28.4	<0.001
	<b>26<sup>th</sup>-50<sup>th</sup></b>	26.3	24.2	
	<b>51<sup>st</sup>-75<sup>th</sup></b>	23.6	23.1	
	<b>75<sup>th</sup>-100<sup>th</sup></b>	24.3	24.2	
<b>Charlson Comorbidity Index</b>	<b>0-3</b>	21.5	18.2	<0.001
	<b>4-6</b>	56.2	54.9	
	<b>≥ 7</b>	22.3	26.9	
<b>Type of MI</b>	<b>STEMI</b>	60.3	50.7	<0.001
	<b>NSTEMI</b>	39.7	49.3	<0.001

<b>Cardiac arrest</b>		30.2	29.8	0.43
<b>Hypertension</b>		43.9	46.4	<0.001
<b>Hyperlipidemia</b>		21.7	24.5	<0.001
<b>Multiorgan failure</b>		90.6	92.7	<0.001
<b>Heart failure</b>		17.4	22.5	<0.001
<b>Hospital teaching status and location</b>	<b>Rural</b>	3.8	4.4	<0.001
	<b>Urban non-teaching</b>	34.2	31.9	
	<b>Urban teaching</b>	62.0	63.7	
<b>Hospital bed-size</b>	<b>Small</b>	6.3	7.0	0.05
	<b>Medium</b>	20.8	20.9	
	<b>Large</b>	73.0	72.1	
<b>Hospital region</b>	<b>Northeast</b>	21.2	21.2	<0.001
	<b>Midwest</b>	20.6	19.2	
	<b>South</b>	37.6	35.7	
	<b>West</b>	20.6	23.9	
<b>Coronary angiography</b>		68.7	60.4	<0.001
<b>Percutaneous coronary intervention</b>		46.1	40.2	<0.001
<b>Coronary artery bypass graft</b>		23.3	15.1	<0.001
<b>Mechanical support device</b>		54.3	41.4	<0.001
<b>Invasive mechanical ventilation</b>		61.9	68.6	<0.001
<b>Non-invasive mechanical ventilation</b>		4.9	5.9	<0.001
<b>Hemodialysis</b>		10.2	13.2	<0.001

<b>In-hospital mortality</b>	38.6	50.5	<0.001
<b>Length of stay (days)<sup>a</sup></b>	15.0 (8.0-25.0)	12.0 (6.0-22.0)	<0.001
<b>Hospitalization costs (x1000 United States Dollars)<sup>a</sup></b>	\$181 (\$94-\$324)	\$263 (\$77-\$342)	<0.001

**Legend:** Represented as percentage or <sup>a</sup>median (interquartile range)

**Abbreviations:** AMI: acute myocardial infarction; CS: cardiogenic shock



**Supplementary Table 4: Sensitivity analysis between sepsis and septic shock diagnosis in AMI-CS**

Sub-Group	Sepsis Diagnosis				Septic Shock Diagnosis			
	Odds ratio	95% Confidence Interval		<i>P</i>	Odds ratio	95% Confidence Interval		<i>P</i>
		Upper Limit	Lower Limit			Upper Limit	Lower Limit	
Age <75 years	1.15	1.11	1.20	<0.001	1.54	1.47	1.62	<0.001
Age >75 years	0.99	0.95	1.04	<0.001	1.14	1.07	1.22	<0.001
Male	1.09	1.05	1.13	<0.001	1.42	1.35	1.49	<0.001
Female	1.13	1.08	1.18	<0.001	1.38	1.30	1.48	<0.001
White	1.11	1.07	1.15	<0.001	1.39	1.32	1.47	<0.001
Non-white	1.13	1.02	1.25	0.01	1.44	1.25	1.64	<0.001
Other races	1.09	1.04	1.15	<0.001	1.42	1.32	1.52	<0.001
No multiorgan failure	0.92	0.83	1.02	0.13	0.95	0.82	1.10	0.52
Multiorgan failure	1.12	1.09	1.15	<0.001	1.44	1.38	1.50	<0.001
No cardiac arrest	1.25	1.20	1.29	<0.001	1.54	1.47	1.61	<0.001
Cardiac arrest	0.83	0.79	0.87	<0.001	1.11	1.03	1.19	0.004

**Abbreviations:** AMI: acute myocardial infarction; CS: cardiogenic shock