

Supplemental Material

Table 1: Comparison of survivors and non survivors within the MI study subcohort

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Table 3: Baseline descriptive statistics of CSWG study population with available baseline lactate by Revised SCAI stage

Figure 1: Sensitivity analysis of alternate SCAI Stage definition and application in CSWG study cohort utilizing baseline lactate values. A. table depicting how alternate SCAI stages were assigned in the applicable study cohort B. Distribution of alternate SCAI stages among applicable study cohort C. In hospital mortality of alternate SCAI stages compared to mortality of existing SCAI stages

Figure 2: Outcomes among MI and HF survivors

Figure 3: Mortality Related to Escalating Drug and Device Therapies. **** ($p < 0.001$) represents statistical difference across treatment levels within each CS etiology. # ($p < 0.05$) represents statistical difference between MI and HF patients at each treatment level

Table 1: Comparison of survivors and non survivors within the MI study subcohort

	Mortality				p-value		
	Survivors (n=299)		Non-Survivors (n=195)				
	n	%	n	%			
SCAI Stage					<0.001		
B	0	0	0	0			
C	52	35.4	23	16.3			
D	58	39.5	56	39.7			
E	37	25.2	62	44.0			
# Pressors/Inotropes					<0.001		
0	73	27.0	13	7.0			
1	76	28.2	39	20.9			
2+	121	44.8	135	72.2			
# MCS Devices					<0.001		
0	15	5.0	6	3.1			
1	200	66.9	94	48.2			
2+	84	28.1	95	48.7			
MCS Type							
Impella	106	35.5	104	53.3	<0.001		
ECMO	77	25.8	92	47.2	<0.001		
IABP	193	64.6	99	50.8	<0.001		
Gender					0.918		
Female	93	31.1	60	30.8			
Male	205	68.6	135	69.2			
Race					0.290		
White	114	38.1	61	31.3			
Hispanic/Latino	12	4.0	4	2.1			
Asian	14	4.7	4	2.1			
African-American	4	1.3	4	2.1			
Other	7	2.3	8	4.1			
Medical History							
HTN	184	61.5	137	70.3	0.075		
Diabetes	126	42.1	94	48.2	0.193		
Afib/Flutter	22	7.4	15	7.7	0.481		
CKD (any stage)	42	14.0	42	21.5	0.004		
PVD	16	5.4	11	5.6	0.335		
COPD	14	4.7	13	6.7	0.337		
CVA/TIA	36	12.0	24	12.3	0.983		
Valvular Disease	16	5.4	8	4.1	0.821		
PCI	90	30.1	70	35.9	0.343		
CABG	17	5.7	23	11.8	0.016		
VT	21	7.0	16	8.2	0.280		
ICD	12	4.0	3	1.5	0.191		
CRT	4	1.3	6	3.1	0.100		
	n	Mean	SD	n	Mean	SD	
Demographic							
Age	298	64.0	13.1	195	66.3	12.4	0.045
Weight (kg)	254	83.2	19.5	149	83.3	19.7	0.978
Metabolic							
AST	200	393.3	1068.2	145	524.7	1062.5	0.269

BUN	255	26.2	16.1	161	31.6	19.7	0.002
Lactate	151	3.7	3.2	141	5.7	4.7	<0.001
HCO3	218	21.1	4.6	149	18.8	4.9	<0.001
Serum Creatinine	271	1.5	1.1	177	1.9	1.3	<0.001
pH	167	7.3	0.1	139	7.2	0.2	<0.001
Hemodynamic							
Admission EF	158	31.7	15.3	102	29.7	16.9	0.327
RAP	188	13.7	5.6	115	16.0	7.6	0.002
PCWP	163	23.8	9.0	108	24.7	9.5	0.441
Mean PAP	161	29.9	8.5	96	30.7	9.8	0.510
Cardiac Output	194	3.8	2.3	135	3.7	1.7	0.545
CPO	182	0.7	0.5	132	0.6	0.3	0.255
Heart Rate	252	89.5	22.5	155	93.9	23.6	0.064
Cardiac Index	200	1.9	0.6	135	1.8	0.6	0.384
MAP	254	77.3	17.2	179	70.8	15.8	<0.001

p-values calculated using chi-sq test of independence or t-test as appropriate. Abbreviations: Afib: Atrial fibrillation; AST: aspartate aminotransferase; BUN: blood urea nitrogen; CABG: coronary artery bypass grafting; CKD: chronic kidney disease; COPD: chronic obstructive pulmonary disease; CPO: cardiac power output; CRT: cathode-ray tube; CVA: cerebrovascular accident; HCO3: Bicarbonate; HTN: Hypertension; ICD: implantable cardioverter defibrillator; MAP: mean arterial pressure; MI: myocardial infarction; PAP: pulmonary arterial pressure; PCI: percutaneous coronary intervention; PCWP: pulmonary capillary wedge pressure; PVD: peripheral vascular disease; RAP: right arterial pressure; TIA: transient ischemic attack; VT: ventricular tachycardia

Table 2: Comparison of survivors and non survivors within the HF study subcohort

	Mortality				p-value
	Survivors (n=532)		Non-Survivors (n=180)		
	n	%	n	%	
SCAI Stage					0.002
B	1	0.6	0	0	
C	92	57.5	47	36.2	
D	41	25.6	44	33.9	
E	26	16.3	39	30.0	
# Pressors/Inotropes					<0.001
0	102	20.3	17	9.8	
1	196	39.0	45	26.0	
2+	205	40.8	111	64.2	
# MCS Devices					<0.001
0	151	28.4	10	5.6	
1	338	63.5	127	70.6	
2+	43	8.1	43	23.9	
Type of MCS					
Impella	81	15.2	67	37.2	<0.001
ECMO	48	9.0	58	32.2	<0.001
IABP	294	55.3	88	48.9	0.14
Gender					0.285
Female	121	22.7	48	26.7	
Male	411	77.3	132	73.3	
Race					0.023

White	236	44.4	85	47.2	
Hispanic/Latino	3	0.6	4	2.2	
Asian	2	0.4	2	1.1	
African-American	9	1.7	4	2.2	
Other	50	9.4	5	2.8	
Medical History					
HTN	178	33.5	98	54.4	<0.001
Diabetes	152	28.6	70	38.9	0.010
Afib/Flutter	162	30.5	65	36.1	0.246
CKD (any stage)	151	28.4	56	31.1	0.875
PVD	13	2.4	9	5.0	0.050
COPD	45	8.5	17	9.4	0.989
CVA/TIA	66	12.4	22	12.2	0.506
Valvular Disease	120	22.6	34	18.9	0.567
PCI	71	13.3	30	16.7	0.236
CABG	32	6.0	28	15.6	<0.001
VT	105	19.7	49	27.2	0.054
ICD	217	40.8	70	38.9	0.339
CRT	65	12.2	21	11.7	0.689
	n	Mean	SD	n	Mean
Demographic					
Age	532	56.6	14.1	180	61.6
Weight (kg)	402	86.3	24.7	132	87.1
Metabolic					
AST	241	283.7	1485.3	87	878.2
BUN	331	34.8	20.7	125	45.2
Lactate	173	3.0	2.9	134	4.9
HCO3	254	25.3	4.9	76	21.2
Serum Creatinine	515	1.8	1.0	172	2.2
pH	98	7.4	0.1	81	7.3
Hemodynamic					
Admission EF	302	19.2	11.0	127	22.6
RAP	481	12.9	6.8	145	17.5
PCWP	370	24.2	9.0	116	26.8
Mean PAP	435	34.2	9.9	114	35.0
Cardiac Output	480	3.6	1.6	150	4.4
CPO	451	0.6	0.3	133	0.7
Heart Rate	508	91.2	21.7	152	95.5
Cardiac Index	487	1.8	0.5	148	1.9
MAP	476	75.2	11.9	152	70.1

p-values calculated using chi-sq test of independence or t-test as appropriate. Abbreviations: Afib: Atrial fibrillation; AST: aspartate aminotransferase; BUN: blood urea nitrogen; CABG: coronary artery bypass grafting; CKD: chronic kidney disease; COPD: chronic obstructive pulmonary disease; CPO: cardiac power output; CRT: cathode-ray tube; CVA: cerebrovascular accident; HCO3: Bicarbonate; HF: heart failure; HTN: Hypertension; ICD: implantable cardioverter defibrillator; MAP: mean arterial pressure; PAP: pulmonary arterial pressure; PCI: percutaneous coronary intervention; PCWP: pulmonary capillary wedge pressure; PVD: peripheral vascular disease; RAP: right arterial pressure; TIA: transient ischemic attack; VT: ventricular tachycardia

Table 3: Baseline descriptive statistics of CSWG study population with available baseline lactate by Revised SCAI stage

	SCAI Stage										P-value
	All (N=645)		B (n=1)		C (n=232)		D (n=220)		E (n=192)		
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	
Non-Survivors	292	(45.3)	0	(0)	75	(32.3)	107	(48.6)	110	(57.9)	<0.001
Male	451	(69.9)	0	(0)	160	(69.0)	159	(72.3)	132	(68.8)	0.37
Shock Etiology											<0.001
MI	288	(44.8)	0	(4.4)	75	(32.33)	114	(51.8)	99	(52.1)	
HF	290	(45.1)	1	(100)	139	(59.9)	85	(38.6)	65	(34.2)	
Other	65	(10.1)	0	(0)	18	(7.8)	21	(9.6)	26	(13.7)	
# Pressors/Inotropes											<0.001
0	64	(10.2)	1	(100.0)	44	(19.0)	3	(1.4)	16	(9.1)	
1	168	(26.7)	0	(0)	82	(35.3)	54	(24.6)	32	(18.8)	
2+	397	(63.1)	0	(0)	108	(45.7)	163	(74.1)	128	(72.7)	
# Devices											<0.001
0	32	(5.0)	1	(100.0)	16	(6.9)	5	(2.3)	10	(5.2)	
1	388	(60.2)	0	(0)	192	(82.8)	102	(46.4)	94	(49.0)	
2 +	225	(34.9)	0	(0)	24	(10.3)	113	(51.4)	88	(45.8)	
Type of MCS											
Impella	240	(37.2)	0	(0)	71	(30.6)	98	(44.6)	71	(37.0)	0.02
ECMO	248	(38.5)	0	(0)	31	(13.4)	106	(48.2)	111	(57.8)	<0.001
IABP	365	(56.6)	0	(0)	141	(60.8)	129	(58.6)	95	(49.5)	0.06
Race											0.86
White	259	(82.5)	1	(100.0)	82	(79.6)	97	(88.2)	79	(79.0)	
Hispanic/Latino	13	(4.1)	0	(0)	4	(3.9)	5	(4.6)	4	(4.0)	
African-American	14	(4.5)	0	(0)	5	(4.9)	4	(3.6)	5	(5.0)	
Asian	11	(3.5)	0	(0)	5	(4.9)	2	(3.6)	5	(5.0)	
Other	17	(5.4)	0	(0)	7	(6.8)	2	(1.8)	8	(8.0)	
Medical History											
HTN	344	(57.1)	0	(0)	113	(56.2)	128	(60.1)	103	(55.1)	0.48
DM2	234	(36.5)	1	(100.0)	86	(37.2)	81	(37.0)	66	(34.6)	0.55
Afib/Flutter	133	(30.7)	1	(100.0)	43	(26.9)	54	(36.0)	35	(28.7)	0.13
CKD (any stage)	136	(25.9)	1	(100.0)	61	(31.3)	39	(22.0)	35	(23.0)	0.05
PVD	23	(5.4)	0	(0)	9	(5.5)	7	(5.0)	7	(5.7)	0.99
COPD	44	(7.3)	1	(100.0)	12	(5.9)	22	(10.3)	9	(4.9)	<0.001
CVA/TIA	64	(10.8)	0	(0)	19	(9.4)	29	(13.6)	16	(9.1)	0.43
Valvular Disease	75	(19.1)	1	(100.0)	37	(24.2)	18	(13.7)	19	(17.8)	0.03
PCI	166	(37.1)	0	(0)	35	(27.1)	65	(38.0)	66	(45.2)	0.02
CABG	55	(10.7)	0	(0)	25	(15.5)	17	(9.0)	13	(7.9)	0.12
VT	97	(22.4)	0	(0)	35	(21.9)	28	(18.7)	34	(28.9)	0.31
ICD	123	(28.5)	0	(0)	50	(31.3)	46	(30.5)	27	(22.5)	0.33

CRT	47	(10.9)	0	(0)	17	(10.6)	23	(15.2)	7	(5.9)	0.10					
	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD				
Demographic																
Age	645	59.7	14.3	1	69.0	-	232	60.1	13.6	220	59.1	14.1	192	59.9	15.5	0.78
Weight (kg)	488	84.6	22.3	1	123.8	-	187	86.2	25.1	160	82.2	18.0	140	84.86	22.5	0.12
Metabolic																
AST	445	713.3	1932.3	1	45.0	-	123	354.6	1368.1	170	493.6	1185.9	151	1257.4	2735.6	<0.001
BUN	515	34.0	21.0	1	43.0	-	150	36.8	34.4	196	35.8	20.9	168	30.0	17.1	0.01
Lactate	645	4.4	4.3	1	1.4	-	232	1.5	0.72	220	2.9	1.1	192	9.8	4.2	<0.001
HCO3	412	20.2	5.6	1	34.0	-	116	23.0	5.0	151	20.8	4.9	144	17.1	5.1	<0.001
Serum Creatinine	636	1.9	1.2	1	1.1	-	230	1.9	1.3	218	2.0	1.1	187	1.9	1.1	0.83
pH	426	7.3	0.1	1	7.5	-	103	7.4	0.1	160	7.3	0.1	162	7.2	0.2	<0.001
Hemodynamic																
Admission EF (%)	394	24.1	16.3	0	-	-	171	22.9	14.2	121	25.6	16.3	102	28.5	18.8	0.02
RAP	499	16.0	6.9	1	11.0	-	192	15.7	7.7	176	15.4	6.1	130	17.2	6.6	0.11
PCWP	389	25.6	9.3	1	14.0	-	139	26.4	9.3	133	25.2	9.0	116	25.3	9.5	0.39
Mean PAP	518	32.9	10.4	1	22.7	-	199	34.9	10.5	180	32.3	9.5	138	31.1	10.7	0.004
CO	514	4.0	3.1	1	4.7	-	210	4.1	2.8	176	3.8	2.4	127	4.2	4.2	0.81
CPO	484	0.64	0.5	1	0.7	-	195	0.7	0.5	165	0.6	0.3	123	0.6	0.7	0.47
Heart Rate	578	96.9	23.2	1	100.0	-	206	96.7	19.8	193	97.3	23.6	178	96.7	26.4	0.99
Cardiac Index	516	1.9	0.7	1	2.1	-	207	1.9	0.7	179	1.8	0.6	129	1.8	0.7	0.37
MAP	617	72.6	15.1	1	65.0	-	224	71.1	14.3	209	71.1	15.1	183	69.2	14.9	<0.001

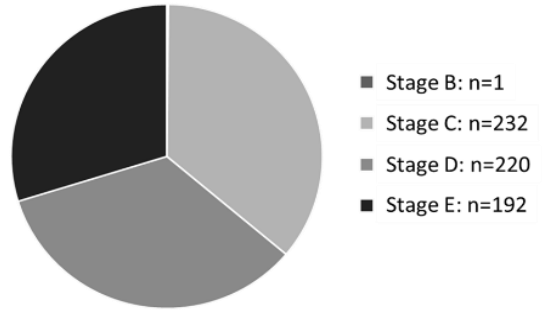
p-values calculated using chi-sq test of independence or t-test as appropriate. Abbreviations: Afib: Atrial fibrillation; AST: aspartate aminotransferase; BUN: blood urea nitrogen; CABG: coronary artery bypass grafting; CKD: chronic kidney disease; COPD: chronic obstructive pulmonary disease; CPO: cardiac power output; CRT: cathode-ray tube; CVA: cerebrovascular accident; HCO3: Bicarbonate; HTN: Hypertension; ICD: implantable cardioverter defibrillator; MAP: mean arterial pressure; PAP: pulmonary arterial pressure; PCI: percutaneous coronary intervention; PCWP: pulmonary capillary wedge pressure; PVD: peripheral vascular disease; RAP: right arterial pressure; TIA: transient ischemic attack; VT: ventricular tachycardia

Supplemental Figure 1

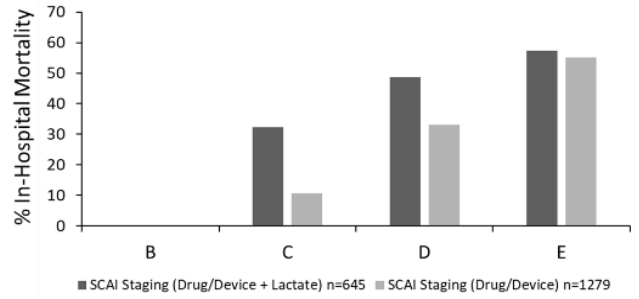
A

Revised SCAI Stages Definitions	
SCAI Stage	Revised Definition
B	Lactate < 2 plus No Drugs or Devices
C	Lactate < 5 plus <1 drug and 1 device
D	Lactate < 5 plus >1 drug or >1 device
E	Lactate \geq 5 only

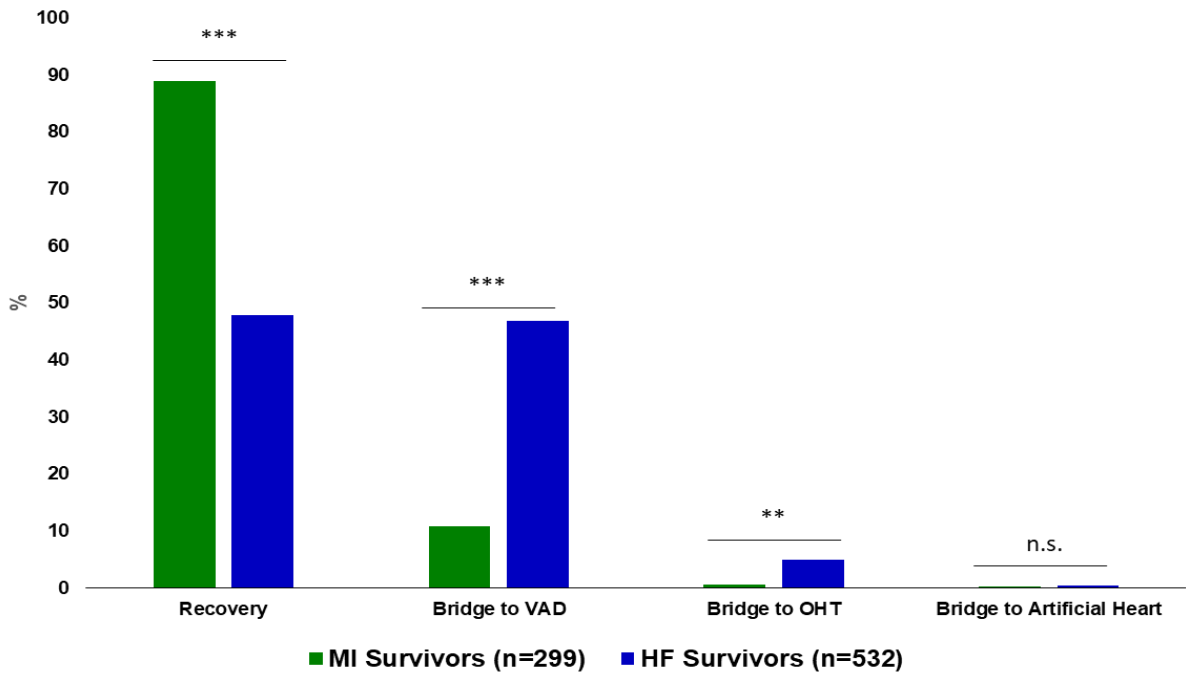
B



C



Supplemental Figure 2



Supplemental Figure 3

All
 MI
 HF

