

Improved Outcomes Associated with the
use of Shock Protocols:
Updates from the
National Cardiogenic Shock Initiative

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NATIONAL CSI ALGORITHM

RAPID Identification of Cardiogenic Shock

↓
Cath Lab Activation

↓
Femoral Access

↓
AMI/CS Confirmed

↓
MCS

AMI/CS Unconfirmed

LHC*

RHC*

Echo*

*As needed to confirm diagnosis

Door
To
Support
Time

Target
< 90
minutes



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CARDIAC POWER OUTPUT
(CPO)
 $CPO = MAP \times CO / 451$

PULMONARY ARTERY
PULSATILITY INDEX
(PAPI)
 $PAPI = sPA - dPA / RA$

MCS



PCI



CPO < 0.6

Right Heart Cath

CPO ≥ 0.6 and
PAPI > 0.9

Calculate PAPI

PAPI < 0.9

Possible RV Failure

Consider
RV Support

PAPI > 0.9

RV Normal

Consider ↑
LV Support

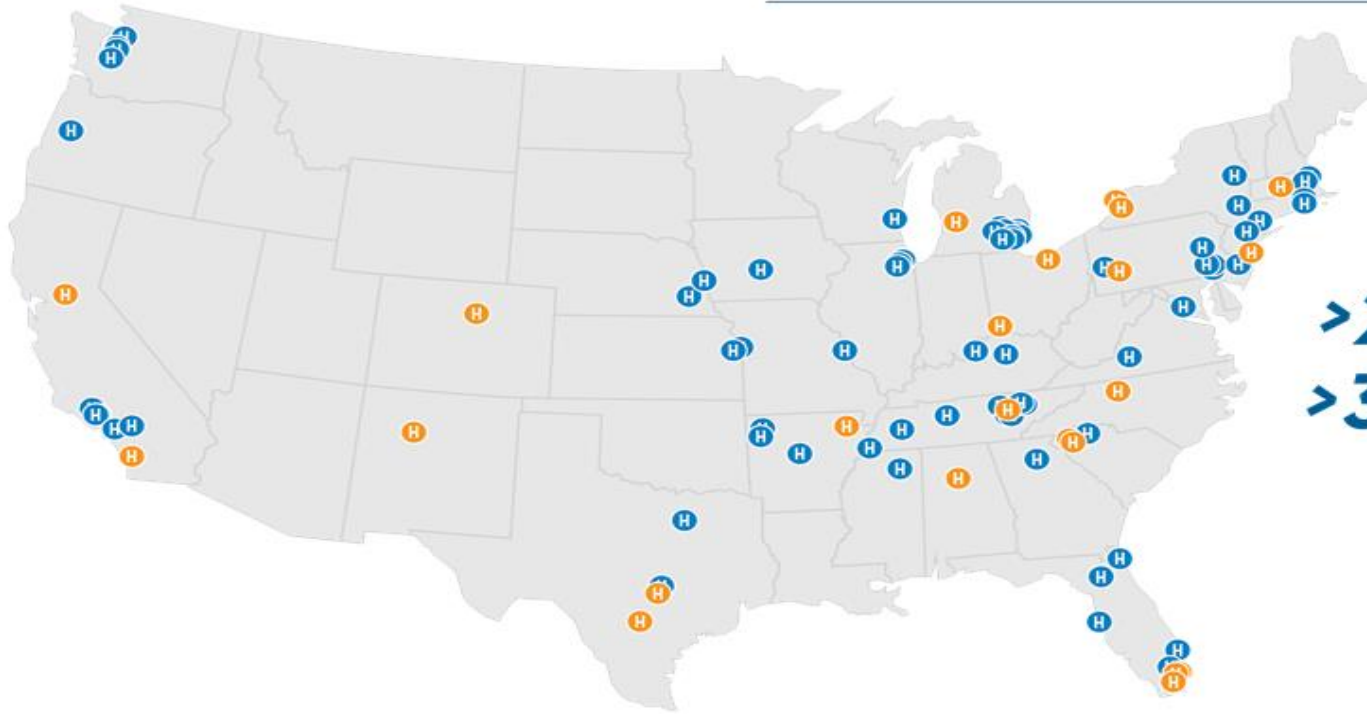
Continue to Titrate
↓ Pressors/Inotropes



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NATIONAL CSI: CLINICAL SITES & ENROLLMENT

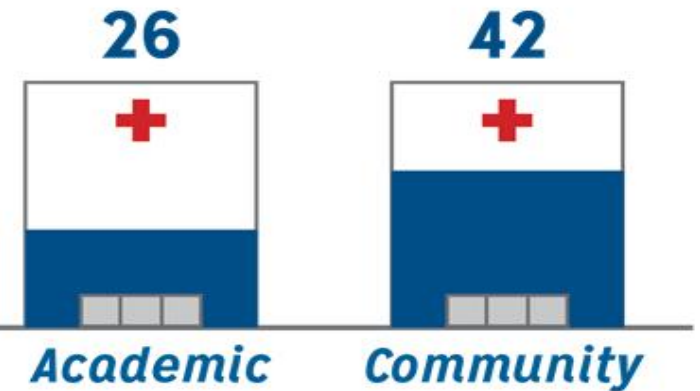


68 active sites from coast-to-coast
have been launched in National CSI*

23 accepted sites – preparing to launch

>200 patients enrolled nationally
>370 total patients screened
(with AMI + cardiogenic shock)

HOSPITALS

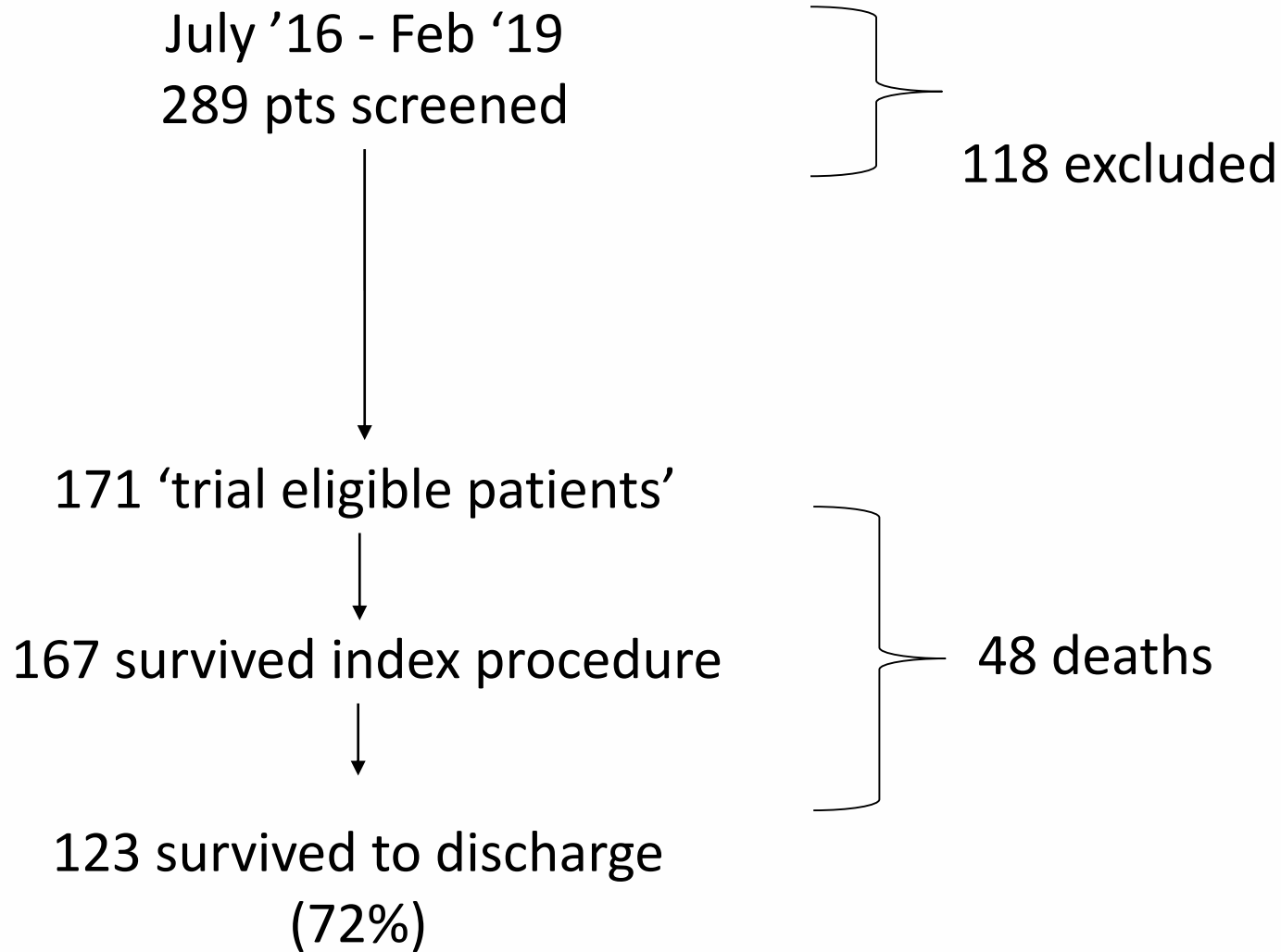


*As of 5/2/19



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- EXCLUSION CRITERIA
- IABP prior to MCS (N=42)
 - No Revascularization, no AMI (N=27)
 - Unwitnessed Arrest, Anoxic Brain Injury (N=17)
 - Mechanical Complication (N=8)
 - Active Bleeding (N=8)
 - Septic Shock (N=5)
 - Non-ischemic Shock (N=5)
 - Major recent surgery (N=4)
 - Decompensated Heart Failure (N=3)
 - LV Thrombus (N=3)
 - Other Shock (N=2)
 - Aortic Stenosis (N=1)
 - Massive PE (N=1)
 - Procedural Complication (N=1)
 - Mechanical Valve (N=1)



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Variable	Sample Size	Age	Inotropes	Cardiac Arrest	HR	BP	Lactate	Lactate ≥ 2 mmol/l	Survival
SHOCK	302	66	99	28	102	89/54	N/A	N/A	53
IABP SHOCK	600	70	90	45	92	90/55	4.1	74%	60
Culprit SHOCK	686	70	90	54	91	100/60	5.1	66%	49
NCSI	171	63	82	42	89	79/51	5.3	77%	72



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Hemodynamic Trends within the First 24 Hours

	Pre-MCS	Post-MCS	12 Hours	24 Hours
HR (bpm)	89	93	88	89
SBP (mmHg)	79	114	106	107
DBP (mmHg)	51	78	73	68
LVEDP (mmHg)	29 (n=76)	-	-	-
dPA (mmHg)	25 (n=52)	24 (n=79)	20 (n=91)	19 (n=79)
Lactate (mg/dL)	5.3 (n=99)	-	3.9 (n=125)	2.9 (n=93)
CPO (W)	0.67 (n=57)	0.89 (n=128)	0.85 (n=117)	0.88 (n=82)



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Survival Post MCS/PCI Based on CPO and Inotrope Usage
(N=113)

		# Inotropes		
		0	1	≥2
Cardiac Power Output (W)	≤0.6	67% (N=11)	57% (N=14)	33% (N=9)
	0.6 to <0.8	100% (N=7)	60% (N=15)	50% (N=4)
	≥0.8	85% (N=20)	79% (N=24)	57% (N=7)



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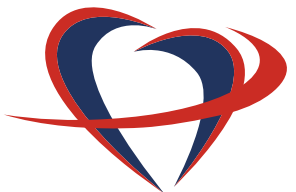
Predictors of Survival at 12-24 hours

N=127



CARDIAC POWER OUTPUT

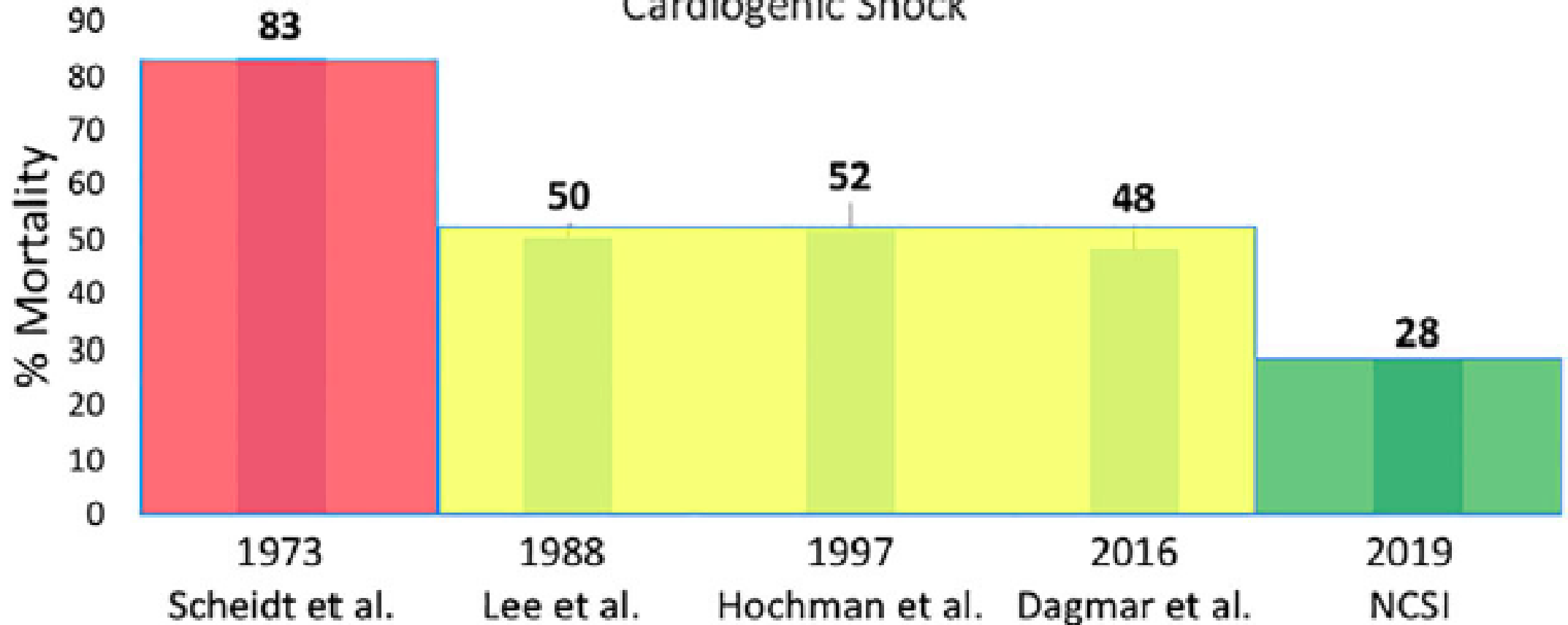
		> 0.6	≤ 0.6
LACTATE	≥ 4	50% Survival (n=9/18)	31% Survival (n=4/13)
	< 4	95% Survival (n=58/61)	65% Survival (n=11/17)



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Historical Advancements in the Treatment of Cardiogenic Shock



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